

# Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

HENRY W. BLAKE and HAROLD V. BOZELL, Editors      HENRY H. NORRIS, Managing Editor  
HARRY L. BROWN, Western Editor      N. A. BOWERS, Pacific Coast Editor      H. S. KNOWLTON, New England Editor      C. W. SQUIER, Associate Editor      C. W. STOCKS, Associate Editor  
C. FRANCIS HARDING, Special Editorial Representative      L. W. W. MORROW, Special Editorial Representative      A. D. KNOX, Editorial Representative  
GEORGE BUSHFIELD, Editorial Representative      G. J. MACMURRAY, News Editor      W. R. ANDERSON, Asst. News Editor

Volume 56

New York, Saturday, July 31, 1920

Number 5

## Lubrication No Longer Guess Work

A STUDY of Prof. Upton's studies on lubrication in this issue leads to the conclusion that we can always improve our methods and practice.

Not many years ago lubrication simply meant "flood her" with any kind of oil or grease. It meant, for instance, big bearing boxes with a great amount of oil waste, which was thrown away as no good after being used a short time. We were not pinching the pennies so closely.

Now we can reclaim the dirty waste, filter the oil and spend thousands on bearing designs—even use ball and roller bearings—and still find such refinements profitable.

Good lubrication means decreased maintenance and less depreciation. Good lubrication is a function of the bearing and of the lubricant used, and all the recovery processes may not decrease maintenance if the wrong kind of lubricant was used originally. We can't afford to say, "Oh, well, we have been using this oil and that grease for years and it's all right" unless we are sure there isn't something better and cheaper on the market. Lubrication is only one item which proves that every detail of a business must be studied with care by the operating engineer.

## What Mean These Jitney Fights?

WHAT is the place of the automobile public service vehicle? We have had many papers and reports on "automobile competition" and "motor truck competition." Have we had any on "how to use the motor vehicle" or "motor truck co-operation"? We set ourselves up as transportation experts, but most of our energies with reference to the question of the motor vehicle are devoted to arguments to show its impracticability. At best we reluctantly admit a limited subordinate field.

Is this the manner in which to approach the question? Or should we not be the first to prove, by using this agency ourselves, exactly where it fits?

Most of us remember the trials of the cables and later the electric cars to get a hearing as possible agencies in the field of local transportation. We believe it was Sir William H. Preece who said in testimony before a committee of Parliament that Edison's plan to operate electric lamps in multiple was impracticable for "demonstration shows (it) to be hopeless and experiment has proved (it) to be fallacious." But such difficulties to be overcome merely added zest to the work.

In the present issue we are presenting the last, and what we hope will prove to be a very useful, installment of Mr. Jackson's "The Place of the Bus" series. Using data therein contained, who are better qualified to place the passenger bus in its rightful sphere of usefulness than the managements of electric railways? Similarly, who are more able to place the motor truck

in the interurban field or as a feeder system than these same managements?

If the public service motor vehicle has a place—and we sincerely believe it has and will continue to have a place—in the transportation field, we believe the electric railway organizations will be woefully lacking in the recognition of their duties and opportunities if they do not take the initiative in the work of placing the bus and truck in their proper spheres with relation to service by rail.

## Dealing in Figures

CAR design is as old as the railway industry, and perhaps we expect too much when we predict an age of standardized cars, for past history does not encourage such a prophecy.

With the many designs available we read with interest of the offer of prizes by the London County Council for a new car design for that system. When conservative England takes such steps there is evidence of dissatisfaction with present designs, or at least hopes for a better one. Then, again, there is food for thought in the remark of a prominent motor bus engineer that street cars are defective because they are designed to be as strong as possible, not as weak as possible. The successful use of the safety car for certain traffic conditions shows that there are reasons for this statement.

As we have many times pointed out, a considerable number of the benefits which would come from complete standardization will result if certain parts or dimensions, such as roof contour, spacing between side posts, etc., are standardized. When the electric railway industry uses only about 10 per cent of the car wheels manufactured and yet has more than 360 different types of wheel, there, at least, seems to be opportunity for more standardization than now exists in railway equipment.

## How's This for a Shop Slogan: "Do It Mechanically"?

THE electrical companies throughout the country have adopted as a catch phrase, and it is a good one, the words "Do it electrically." It is a challenge to every prospective or possible user of electricity to apply it for lighting, heating and power production, in preference to other means or in addition thereto. In the shops and elsewhere on the electric railway properties of the country there are still many operations being performed by hand that could be done much better and cleaner by machines. It would be well, therefore, for the master mechanic, the roadmaster and others to paraphrase the above expression to the form: "Do it mechanically." There is possibly less need for a reminder of this kind now than there was some years ago, because it is so difficult and expensive to keep good

mechanics that a mechanical device is a godsend if it is reasonably effective.

This reminder is needed less by the master mechanic or roadmaster than it is by the man higher up, who holds the pursestrings and who "has to be shown" when a requisition for a new tool or other device is put through. To the latter we say that good maintenance in these days means good equipment, much of which will pay for itself in short order. The writer was impressed in one shop lately visited by the close adaptation of the tools to the work to be done. He was not surprised, therefore, to hear the master mechanic in charge say that he believed in using the best tool available in performing each shop operation. There is opportunity for much ingenuity in finding the best tool for each job or, in the event of lack of such tool on the market, in making something to fit the need.

---

### Selling Transportation Has Become a Necessity

**T**HE developments of the past few years and, more acutely, some recent situations with which we are all more or less familiar, show that electric railway management does not consist only of the ability to operate a road economically. The days of development and design and the days of perplexing operating problems have both presented their special difficulties, but they have been, on the whole, fairly well mastered, or at least realized. But the outstanding problem for electric railway management today is to sell the transportation service which the railway furnishes or is in a position to furnish.

As we see it, there are four parts or phases of the business which must be sold in order that the whole transportation service be put across fairly and adequately.

First of all, we must sell the necessity of railway service as compared with any and all other forms of transportation. To do this we must prove, among other things, that jitneys alone will not answer the needs of a progressive community, but that unless jitneys are put on the same basis as regards schedules, taxes and other burdens and regulations they will drive the cars from the streets.

In the second place, we must thoroughly establish in the minds of all the good faith of the management and its desire to please the public so far as its ability to do so will permit.

In the third place, we must sell the monopoly idea—the economy and sufficiency of public utility service under one management.

Finally, we must sell the necessity for increased fares and rates, under present-day conditions.

All this is no small job. And it must be done thoroughly. And the sale must be made to two classes of people: First, the employees of the company, the men who perform the many acts connected with the actual operation, and, second, the public which uses the transportation service which the railways sell.

This is the big problem of today. It does no good to bemoan past failures, to condone past mistakes, to repeat past history. The job today is to sell transportation, and all energy should be put to do that job.

Too frequently we have seen what we interpret to be a lack of appreciation of the necessary psychological link between the management and its public—a little tendency to stand aloof, perhaps, or to neglect that

closeness of personal touch which makes the difference between understanding and lack of understanding. We believe such acts are entirely thoughtless or the result of its being "the same old story," to talk to the public. But it's always a new public—new men and women or boys and girls become men and women. Perhaps there is an unconscious touch of the deplored policy of bygone days, represented by the alleged statement of the late William K. Vanderbilt, when railway men too often acted on the theory that they had the only real transportation agency and the public had to take it or do without. It may have been true, but the position was wrong psychologically.

That an act is unconscious makes it none the less harmful, and the result is felt not by any particular company but by the industry as a whole. It is a common duty for all of us to "sell transportation."

How can we accomplish what we want? That "actions speak louder than words" is as true today as ever in dealing with the public. This public is reasonable. Most Americans want to give a square deal, and they will, when shown. But they must be shown, and not only by argument but by example. Electric railway managers are susceptible to getting out of touch with the public, and a big part of the job is to guard against this.

Know your customer, make him respect you and like to do business with you. Acquaint him with your business and he is three-fourths won.

---

### There Are Teams Now at Work

**W**E SAID something in our issue of July 10 about "The Coaches Can't Do It All" and we have been impressed by two or three examples since then which go to prove the point we made. We have already mentioned the fact that one element of electric railway management today is to "sell" the railway industry to the men on the job as well as to the public. The results of such work come back to us in gratifying manner.

A most inspiring instance of this truth, which occurred last week, was the waiver of the Quaker City carmen of their right to insist upon the wage increase due them until the company can afford to grant it. "For nine and a half years the management has played fair with us and it was about time that we came back at them," as one P. R. T. employee said. Another similar incident, though not quite so dramatic, was the support which employees' representatives have given the New York Railways in their recent troubles and arguments with Mayor Hylan. And another instance is the concerted action of the employees of the Connecticut Company in the various cities in which the jitney fight now rages. One of their representatives said in a recent town meeting, gathered to discuss the railway-bus competition, that for twenty or thirty years he and his fellows had been treated well, had had fair play by the management, and so were with the management now in this time of trouble. In both New York and Connecticut employees' petitions were presented which indicated not only a selfish interest of the men but also a conception of some of the real problems of the systems involved.

We repeat that "The Coaches Can't Do It All" and that it pays to have the men on the system intimately acquainted with the problems of the business—entirely "sold" on the needs of the industry.

## Power Factor and Load Factor Important on Energy Contracts

WHAT load factor and power factor do you maintain upon your system? How much do they cost you per year? What limitations do they place upon your operation?

It is needless to emphasize again the losses in capacity of equipment, efficiency, regulation and net income resulting from operation at low power factor and load factor upon the system for which electrical energy is generated by the railway company itself. However, with the increased tendency to purchase energy for railway operation, or at least to allocate cost of energy between the railway and lighting departments of combined utilities, the problems of load factor and power factor are confronted in slightly different form.

The tendency of large central stations to penalize such low factors or to offer a bonus for the maintenance of high factors is increasing. Whatever may be the arguments against such a practice, they are principally applicable to the small consumer, who has difficulty in understanding both the meaning of the terms and the justification of the claims.

In the wholesale contract it should be relatively easy to reap a considerable saving as a result of a bonus for load factors 40 per cent and above and power factors between 85 and 100 per cent. In no case is it easier to maintain high power factor than in the average railway substation, equipped with synchronous converters or motor-generator sets. In the case of load factor the problem of obtaining sufficient diversity of load is rather more difficult. However, in large city systems, combined urban and interurban utilities and electrified steam railroads with regenerative braking relatively high load factors should be available. Recent reports from the Chicago, Milwaukee & St. Paul Railroad indicate that load factors have been increased from 40 to 60 per cent. This is an excellent showing for such a system.

A portion of the saving, particularly in the case of power factor, might well be passed along to the substation operator who is active in maintaining such a condition. It should not be necessary to install an elaborate metering system upon which to base such a plan. Regular reading of the substation power-factor meter, checked occasionally by an inspector, should be sufficient to determine the average value for the month. Even if a recording instrument seemed desirable for each substation the saving would probably be much greater and the expense involved in recording considerably less, respectively, than in the case of coasting clocks and energy measurements made at present upon individual cars as a basis for a bonus system for motormen.

It is possible that in our attempt to run down and eliminate every possible operating and maintenance cost, in these days of conservation, we have neglected this very important saving. As a result of a recent investigation made by H. C. Thuerck of Purdue University 88 per cent of the central stations questioned were found to include load factor clauses in their contracts and 50 per cent include clauses involving power factor. As these central stations represent the largest utilities of the country the practical possibility of closing contracts in the future involving such clauses is very evident.

A typical clause, involving both load factor and power factor, taken from the wholesale contract form of one of the large central stations reads as follows:

The maximum demand shall be determined from actual measurements of the customer's demand and a consideration of the power factor at which these measurements are taken and shall be calculated by multiplying the greatest integrated fifteen-minute demand occurring at any time within the twelve months ending with the month under consideration (eliminating from consideration, however, peaks or demands due to short circuits, line disturbances, etc.) by 80 per cent divided by the actual power factor at which the measurement is taken.

The average annual load factor of the central stations reporting was 52 per cent, with a range of from 32.5 to 92.2 per cent. The monthly load factors vary from 40 to 92.8 per cent, with an average of 61 per cent. Power factors were found to cover the entire field from 70 to 100 per cent, with an average of 90 per cent.

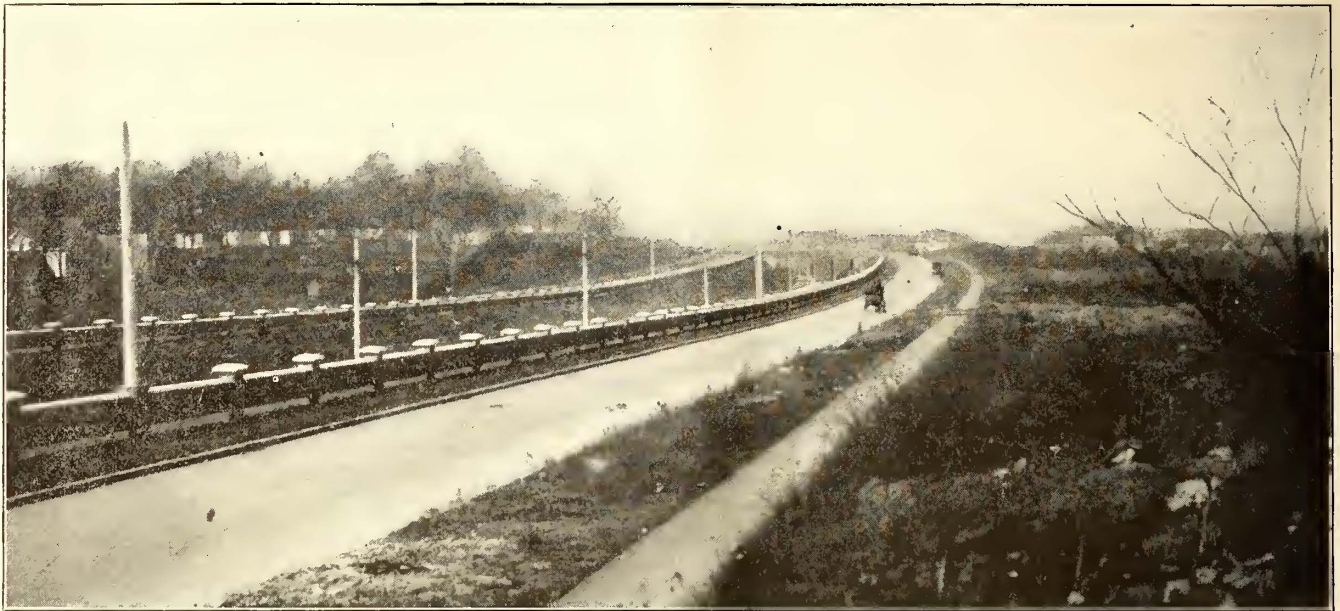
It does not follow, of course, that the addition of a relatively low load-factor load of a railway system will lower the load factor of the central station. In fact, it is very likely to raise it, due to the diversity of the two peak loads. As increased load factors and power factors mean increased economy and greater conservation of fuel such problems are worthy of extensive detailed study.

## Interlocked Planning of Transportation System and Town

VERY desirable new residential suburb of Cleveland was recently made more desirable by the placing in operation of a new rapid transit railway which makes it possible for the suburbanite to go from his home to the Public Square in less than thirty minutes despite a distance intervening of 9 miles. This new railway is described on another page of this issue. The interesting part about this is that the planning of the railway was interlocked with the planning of the suburb. Transportation was just one phase of a very comprehensive plan worked out by a firm of real estate operators for opening up a great tract of land outside of Cleveland for residential properties.

These men have demonstrated a pretty good knowledge of transportation matters as well as real estate. They realized that high speed transportation connecting their property with the heart of the city would be a tremendous advantage in disposing of the land at a profit. They made the high speed service possible by securing a private right-of-way from their property all the way to the Public Square and built a road without any grade crossings except those in the suburb itself. Then they accomplished what in effect is an excellent skip-stop system in the suburb by so laying out the streets that there are only three through street crossings with the railway per mile and hence only three stops per mile. This secures the economy of few stops and makes possible a high schedule speed—the advantages of skip-stop operation—without introducing any of the criticism of the skip-stop plan, for if the street on which a man lives does not run through to the car line he is not going to kick because the car doesn't stop at his corner.

Furthermore, by limiting the number of stops and thereby multiplying the number of riders to board and leave the cars at each stop there will develop there a business center, resulting in a great enhancement of land values. This joint real estate and railway development in Cleveland will be at least one case, apparently, where the builders of the railway will derive some benefit from the great appreciation of property values that always follows good transportation.



DOUBLE BOULEVARD AND DEPRESSED RAILWAY CONSTRUCTION THROUGH EAST END OF SHAKER HEIGHTS

## New Rapid Transit Line in Cleveland

**Line Built as Part of Real Estate Development, with Entrance to Public Square Over Private Right-of-Way, Has Become Main Factor in New Union Station Project—  
Temporary Entrance Over Surface Line Tracks Begun  
with 20 m.p.h. Schedule Speed Average for Run**

SEVERAL years ago the Van Sweringen Company, Cleveland, Ohio, platted a 4,000-acre tract of land just outside the city limits and to the southwest of Cleveland and opened it up for home sites under the name of Shaker Heights. Since that time nearly 8,000 properties, ranging in size from 40-ft. lots to two- and three-acre pieces, have been sold and numerous families have taken up residence in this incorporated suburb.

As the new suburb was more than 8 miles from the Public Square and practically without transportation facilities, a part of the comprehensive plan of the Van Sweringen interests was to provide a high-speed electric railway service over private right-of-way from the suburb to the Public Square at the heart of Cleveland. This, it was planned, would give the residents of this section a means of getting to their work in the city in much less time than they could when living in the more desirable residential sections within the city limits, where they would depend on the street railway. This promise of a rapid transit system provided a forceful selling argument in interesting prospective buyers in Shaker Heights real estate. This was all done in good faith, and the railway right-of-way laid out and provided for in the immense program of street improvements and other development work which the real estate company carried on, involving the investment of large sums of money. But while the first contracts for work on the rapid transit line were let in 1914, the war-time restrictions, high prices and scarcity of materials have delayed the completion of the railway until recently. Operation was finally begun on Sunday, April 11, 1920.

For the purpose of building the rapid transit line the

Cleveland Interurban Railway Company was organized as a subsidiary of the Van Sweringen Company. The location of the private right-of-way of this railway from the Public Square to Shaker Heights, the present route from the Public Square to Thirty-fourth Street over lines of the Cleveland Railway, and the location of Shaker Heights relative to the city of Cleveland are shown in an accompanying map. The private right-of-way of the company, which has already been secured, begins practically at the Public Square and extends out through the valley of the Cuyahoga River, adjacent to the Nickel Plate Railroad, and thence through a cut without grade crossings practically to the junction point in Shaker Heights. From here out the line divides into two branches, both built on the surface, one extending 2 $\frac{7}{8}$  miles beyond the junction over the South Moreland Boulevard and the other 2 $\frac{3}{8}$  miles over the Shaker Boulevard. The distance from the Public Square to the junction is 6 $\frac{1}{2}$  miles, making the total distance to the end of the South Moreland branch 9 miles and to the end of the Shaker Boulevard branch 8 $\frac{3}{8}$  miles, a total length of double-track line of 11 $\frac{5}{8}$  miles and an equivalent single-track mileage of 23 $\frac{1}{4}$  miles.

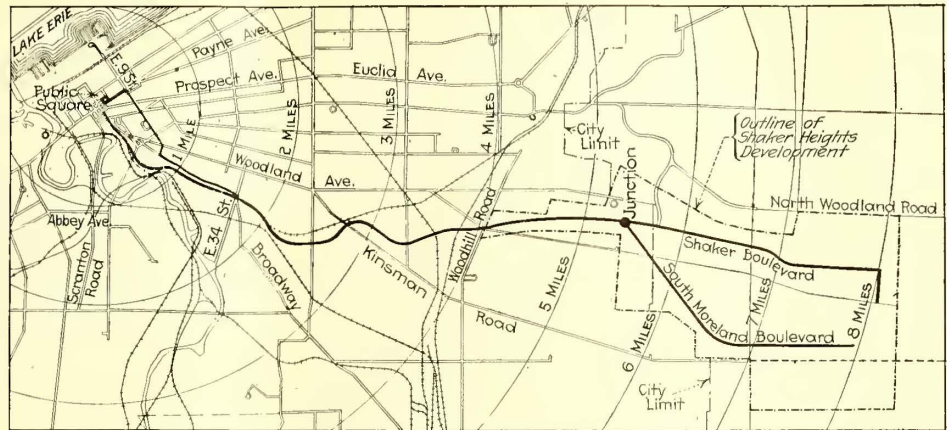
Because the right-of-way in the central section of the city made possible connection with practically every railroad entering Cleveland easy, the Cleveland Interurban Railway rather naturally became involved in the Union Station project as affording the best entrance into a new station for all steam and electric lines, having a location close to the Public Square. The complications of this larger undertaking have delayed the completion of the plant of the interurban company for its own entrance to the Public Square, and temporarily

the rapid transit cars are therefore being routed from Thirty-fourth Street in over existing lines of the Cleveland Railway, a distance of 1½ miles. The routing of the rapid transit cars at present is therefore around the post office loop adjacent to the Public Square, thence north on Superior to East Ninth Street, west on Ninth Street to Broadway and along Broadway to Thirty-fourth Street, there joining the private right-of-way.

The right-of-way is laid out the entire length and all bridges designed for an ultimate of four tracks, looking toward an express and local service at some future time. At present the system has been double-tracked throughout. As soon as the right-of-way enters the Van Sweringen property it widens out to provide a 90-ft. railway area through the center, with a 50-ft. boulevard on either side. There are no grade crossings between the downtown terminal and the junction point in Shaker Heights. From Woodhill Road to the junction the tracks are depressed and a brick and concrete fence, unique in design, ornamental and comparatively inexpensive, has been built for protection along either side of the depression. The details of this fence design are taken up in a later paragraph. The boulevard lighting poles are built into this fence, and it is the plan to carry the feed wires for the lighting system on the trolley poles with a lead-in from each lamp, thus avoiding any wires paralleling the boulevard other than those on the trolley poles. The frontage along the boulevards is to be developed with high-grade apartment buildings.

One of the unique features developed in connection with the operation of the cars on the surface from the junction point to the ends of the two lines is that the layout of streets was so arranged that there would be a grade crossing only every one-third mile. This serves the dual purpose of minimizing the danger of accidents at grade crossings and reducing the number of stops to a maximum of three per mile. This feature was carried out completely in connection with the South Moreland Boulevard branch, but it was not thought of until the street construction work along Shaker Boulevard, which was done first, was too far along to change. This control over the number of stops through the street arrangement is better appreciated by a glance at the accompanying map of Shaker Heights.

A further result of the limitation of the number of stops to three per mile through the layout of street intersections will be to make each of these points a business or community center. As a part of the development of this idea the promoters plan to build a railway station at each of these points and so to design it as to provide for important concessions from which an income will be derived. This return, it is expected, will considerably more than offset the interest on the investment and the maintenance of the property. Each of these stations is to be of different architectural design, providing a distinctly ornamental addition to the business center that will harmonize with the surroundings



OUTLINE MAP OF SECTION OF CLEVELAND, SHOWING LOCATION OF SHAKER HEIGHTS DEVELOPMENT AND THE ROUTE OF THE NEW CLEVELAND INTERURBAN RAILWAY

and meet business needs. None of these stations has as yet been built, but the plans for them are pretty well along and several of them will be built this summer, according to present plans.

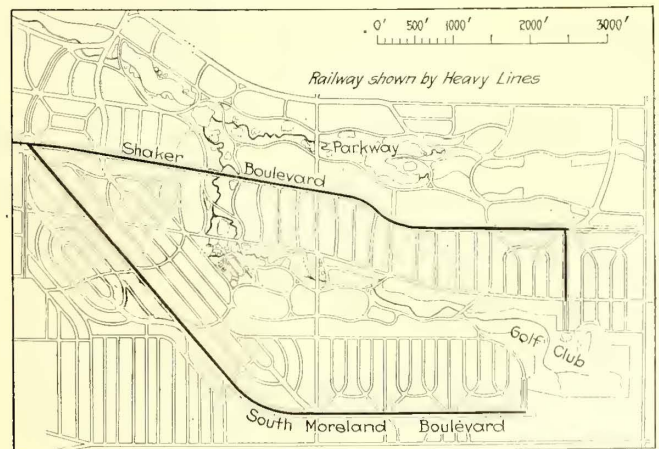
TRACK AND OVERHEAD CONSTRUCTION

The track and overhead are of high-grade construction, following along standard practices. The track is all of open type construction, with 90-lb. A. S. C. E. rail laid on 8½-ft. x 7-in. x 9-in. oak and yellow pine ties, some creosoted and some not, depending on what could be secured. The roadbed is completely rock ballasted. Bonzana continuous joints and Abbott joint plates and welded bonds of the type developed by L. P. Crecelius, electrical engineer Cleveland Railway, were used.

The overhead is of the catenary type, supported on concrete center poles. The trolley used was of No. 0000 size and about 4 miles of 500,000 circ.mil feeder is carried on short side-arm brackets on the trolley poles.

ROLLING STOCK FOR THE RAPID TRANSIT LINE

For the time being, four of the Cleveland Railway center-entrance and exit cars, refitted for the rapid transit service, comprise the complete rolling stock equipment of the interurban railway company. These



MAP OF SHAKER HEIGHTS SHOWING LAYOUT OF STREETS TO LIMIT THE NUMBER OF STOPS TO THREE PER MILE



VIEW OF NEW LINE AT JUNCTION POINT WHERE SURFACE CONSTRUCTION BEGINS, SHOWING CENTER POLE AND CATENARY OVERHEAD CONSTRUCTION



TYPICAL BRIDGE CONSTRUCTION, SHOWING PROVISION FOR AN ULTIMATE OF FOUR TRACKS, AND TEMPORARY STAIRS DOWN TO THE LOADING POINT

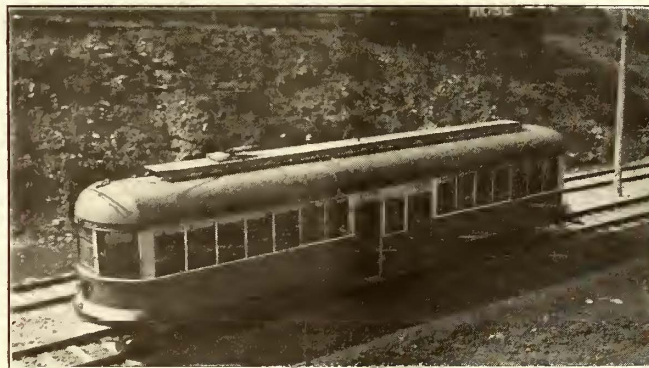
will be added to as the territory served develops. These car bodies are owned and supplied by the Cleveland Railway under an operating agreement, which will be given in a later paragraph, but the cost of re-equipping them was paid by the interurban company. The equipment comprises Brill 68-E-1 trucks mounted on 26-in. wheels and having a 6-ft. wheelbase, four Westinghouse 340-A-1 motors geared for 45 m.p.h., Westinghouse HL multiple-unit control and automatic air brakes. The car bodies are 51 ft. long and have longitudinal seats on one side and cross-seats on the other, with a well in the center, and provide a seating capacity of sixty passengers. The cab partition at the front end of the cars was moved back slightly to make room for the installation of the multiple-unit control equipment in the cab. The installation of this equipment in the cab was made partly because of lack of clearance and space underneath the car and partly to make frequent inspection, cleaning and any repair work easy. The manner in which the control mechanism was mounted in an asbestos lined cabinet in the motorman's cab is pictured in an accompanying illustration.

A thirty-minute service is being given on both the South Moreland and

Shaker Boulevard branches, the cars on both lines being operated into the city, thus providing a fifteen-minute service between the Public Square and the junction point. As the riding increases with the growth of the territory additional cars will be added to each train rather than to shorten the headway. This manner of increasing the service will be carried out in order to preserve certain definite times of arrival and departure of cars, since it is believed there will be less objection to comparatively infrequent service if the riders know what the schedule is.

The running time from the end of either branch to the Public Square is at present twenty-seven minutes, permitting of a three-minute layover at either end of the run, each car making one round trip an hour. The schedule speed obtained in this service is at 20 m.p.h., including stops. When the union terminal project is

completed, so that the cars can be operated the entire distance over private right-of-way, it will be possible to cut seven minutes off the running time each way. This will give a schedule speed, including stops, of 27 m.p.h., and make it possible for residents at the end of the lines in Shaker Heights to ride to the Public



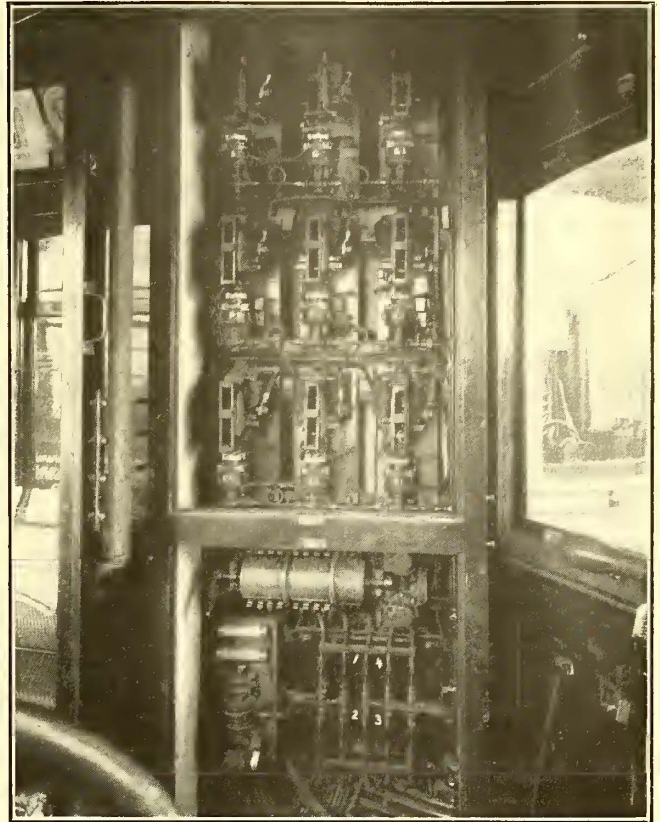
AT TOP, TYPE OF CAR BEING USED IN THE RAPID TRANSIT SERVICE. AT LEFT, CONSTRUCTION ON PRIVATE RIGHT-OF-WAY OF CLEVELAND INTERURBAN RAILWAY IN CLEVELAND. AT RIGHT, DEPRESSED RIGHT-OF-WAY BETWEEN WOODHILL ROAD AND THE JUNCTION, SHOWING ORNAMENTAL FENCE ALONG EITHER SIDE

Square in twenty minutes. A flat fare of 10 cents for a ride over the full length of the line, or any part of it, will be collected when operated completely over the company's own right-of-way begins. At present the 5-cent fare is collected when the passenger boards the car and another when the car passes from the city line to the interurban line or vice versa. An effort was made to work out a zone plan in this connection, but the difficulties of locating zoning points and features of competition with the Cleveland Railway city lines brought the conclusion that this was not expedient. The 10-cent flat fare, however, even from points within the city limits to the Public Square, has not seemed to deter people from riding on the rapid transit line, though they could ride over the lines of the Cleveland Railway from the same point for 5 cents. For example, officials of the interurban railway have been surprised at the amount of business originating at the Woodhill Road stop. This is in a community settled largely by workmen and served by a city line. However, the running time to the Public Square on the latter is twenty-five minutes, whereas it is only fourteen minutes on the rapid transit line. This difference of running time has apparently attracted the patronage of numbers of working people despite the 10-cent fare.

It has been found, since the operation of the rapid transit line began, that the travel of domestic employees and mechanics between the city and Shaker Heights gives about equally heavy traffic both ways during the rush hours. This characteristic will undoubtedly change as the territory becomes more thickly settled and the number of building operations decreases, although there will very likely continue to be a noticeable traffic of domestic help outbound in the morning and inbound in the evening.

#### OPERATING AGREEMENT WITH CLEVELAND RAILWAY

The Cleveland Railway entered into an operating agreement with the Cleveland Interurban Railway last September. By the terms of this contract the former furnishes the rolling stock (temporarily) and the trainmen and power necessary for the service and maintains the overhead equipment and all fixtures, collects and retains all fares and pays the cost of operation, including maintenance, transportation expenses, general expenses, taxes and interest. The units to be used in figuring these costs are the average costs per car-mile of operating the city lines. If there is any surplus over these costs the city company pays the interurban company 90 per cent thereof, but the latter indemnifies the

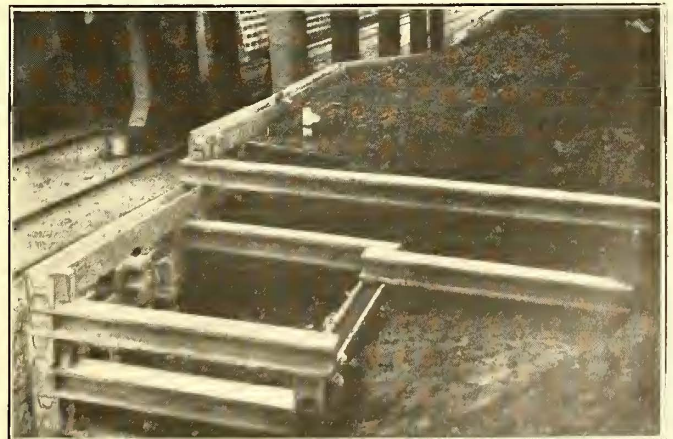
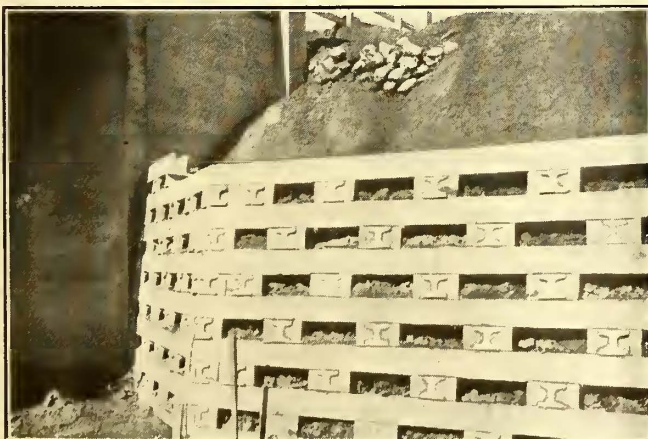


MULTIPLE-UNIT CONTROL EQUIPMENT MOUNTED IN THE CAB OF THE RAPID TRANSIT CARS

former against any deficit. The city company is entitled to collect and retain the regular rate of fare from passengers on the rapid transit cars while they are on the city track between the Public Square and East Thirty-fourth Street, in addition to the fares collected from passengers while on the interurban company's track. In return for the revenue thus obtained from passengers while on the city track the city company pays the interurban company 2 cents per car-mile for the use of its cars.

The agreement was made for a period of two years from Oct. 1, 1919, and for another year beyond that expiration if neither party desires to terminate it upon its expiration.

The fence, previously referred to, along the depressed right-of-way was constructed by first pouring a 24-in. square footing 3 ft. deep and coming up to the level of the ground every 15 ft. Four 1/2-in. steel rods, 24 in.



CONCRETE CRIBBING USED IN SHORING UP THE SIDES OF CUTS

long, were then set in this concrete, with 12 in. projecting above the top. Pre-cast heavily reinforced 7-in. x 6-in. concrete bottom rails were then laid to span these footings, being placed between the vertical rods set in the footings.

With the bottom rails in place, a single tier of brick was laid on the footing and carried up to the proper height, forming a hollow post 17 in. square on the outside. The posts were then filled in with concrete, the 13-in. wide heavily reinforced concrete top rails laid in place and the posts topped off, filled in with concrete and capped, giving a solid monolithic construction. The space between the bottom and top concrete rails was then filled in with a 4-in. curtain wall of brick. This brick curtain serves only to complete the appearance of the fence, the posts and top and bottom rails providing all the strength necessary. This has been attested by the manner in which the fence has withstood the shock of a severe bump from an automobile on two or three occasions. The curtain wall has been knocked out, but the concrete rails have not been damaged, though the automobiles have.

The property of the Cleveland Interurban Railway was planned very largely by W. E. Pease, chief engineer the Van Sweringen Company.

## New Discipline Plan in Los Angeles

### Merit and Demerit System with Novel Features Adopted by Los Angeles Railway Corporation for Its System

A MERIT and discipline system that makes employees disciples of merit is the program of cooperation between executives and platform men that has been introduced by the Los Angeles Railway Corporation. On the theory that a man's past record should not prevent him turning over a new leaf for efficient service, the company has discarded all previous conduct sheets. A new card index has been opened for veteran and new employees alike.

Commencing with a mark of 100 per cent each month, a motorman or conductor has the opportunity to maintain his clear record for thirty days and earn the cash bonus which is attached to the pay envelope or he may automatically discharge himself by accumulation of demerits which would bring his efficiency below a mark of 75 per cent. While a man may earn the bonus by keeping his commencement record of 100 per cent clear, he can place himself in line for special consideration and promotion by gaining credits that would give him more than 100 per cent.

G. J. Kuhrts, general manager of the company, placed this new system into effect, and under the "Kuhrts Plan," as this system has become known, supervisors have the first authority to impose credits or demerits. Since they are the closest to the platform men during working hours they are in position to observe when an employee is exerting his best efforts to render accurate daily reports, display exceptional acts in prevention of accidents or injury and like matters. At the same time the supervisor is the first to observe when an employee shows a laxity in observance of running schedules, careless operations of car, failure, neglect in collection of all fares and rendering of prompt and proper reports.

The supervisor's observations are reported to the division superintendent and the latter assumes jurisdiction when the supervisor finds himself unable to

handle the situation and virtually confesses failure. If a case of alleged negligence in duty is so complex that the division superintendent is unable to handle it, then it goes to the manager of service, George Baker Anderson. The latter represents the "Court of Last Resort," and he reviews all credits and demerits. An employee is welcome to appeal his case to the manager of service after a supervisor or superintendent has meted out discipline and he is assured of a hearing. At the end of the month each platform man receives a card showing his efficiency percentage for the month, then the slate is wiped clean for the next month.

The "Kuhrts Plan" is designed to increase the initiative of platform men as contrasted with the discarded system of expecting men to follow orders and ask no questions. Practical suggestions for the betterment of service are recognized under the merit system and encouraged by an award of from five to fifteen points credits.

Placing opportunity in the hands of the men instead of merely expecting them to fulfill routine instructions is the keynote of this plan. A quick response has come from them. Since the plan has been in effect increased efficiency as well as the increased care of materials has been noticeable.

When a man's percentage of efficiency falls to less than 75 and he stands at the threshold of dismissal his general attitude to the company is carefully weighed before final action is taken. The "Kuhrts Plan" is to help the man who will try. If in the face of his opportunities he shows general disregard for his own welfare as well as that of the company and his offences are serious he automatically discharges himself in short order. But the final word dismissing a man cannot be given until approval has been given by the manager of service.

The grading of credits or demerits is on the basis of from five to fifty points each, with five points representing 1 per cent. The credit accounts are balanced monthly and the bonus will come in the form of a Christmas gift. Payment will be made Dec. 15, but a man must have been in the company's service six months to be eligible. This feature encourages men to stay with the job and take a lively interest in their work, knowing that financial reward and appreciation are forthcoming.

## A Unique Service

IN a recent issue of *System* the following suggestion for increasing the volume of business of drug stores and other busy corner stores is offered. This appears to be a suggestion upon which the electric railway may many times capitalize.

The note says: Street car callers, similar to the train callers in railroad stations, are used successfully by the management of a drug store in Springfield, Ohio, as a service to the public. The store is situated on a street corner where the majority of car passengers transfer from one line to another.

For the benefit of the public, the arrival of cars on the different lines is announced by a caller in the drug store. A customer does not have to worry about missing a car, but can make any necessary purchases while waiting in the store.

That this and other service plans inaugurated by the store are successful in winning customers is attested by the heavy increase in the volume of business.



# The Place of the Bus—VI

In This Final Article It Is Shown that Practically Every Kind of Motor Bus Operation Costs More Than Modern Car Service on a Well-Traveled Route, Proving that at Present Costs the Bus May Supplement but Cannot, from an Economical Point of View, Supplant the Electric Railway Upon the Basis of Equal Fare and Responsibilities

BY WALTER JACKSON  
Consulting Engineer



FIFTH AVENUE, NEW YORK, LOOKING NORTH FROM FORTIETH STREET. THERE IS AMPLE ROOM FOR THREE LINES OF VEHICLES IN EACH DIRECTION

“THE world is so full of a number of things,” sang Stevenson—fancy flights about motor bus profits included, we would add. Between the well-meant enthusiasm of the motor bus salesman, the exuberance of the traction-fighting city official and the entrancing “within-the-law” prospectuses of the stock broker the inquirer finds it difficult to hit the straight trail to the altar of Truth unless he is prepared to seek the facts at the source. In the cases of individual bus operation, hereinafter presented, the data were obtained through personal interviews with scores of busmen and bus dealers and their statements were then checked and counterchecked to allow for the usual percentage of prevarication. In the cases of companies recourse was also taken to inquiry of the management, to the study of private records and court proceedings and to analysis of public, but not always easily accessible, reports. As much material was obtained in confidence the writer will be sparing in the use of names but liberal in the description of conditions that affect business and costs.

The figures have been prepared to cover the entire range of motor bus operation from the Ford one-man bus to the *deluxe* double-deckers, inasmuch as the success or failure of motor bus service depends so largely upon choosing the right capacity. A short-haul seventeen-seater will have a better schedule and make more money than a thirty-seater if the latter has to run during many thin hours, and there are cases where a 5-cent vehicle makes money where a 10-cent bus

would lose it. Most of the data given were obtained in studies for various clients during the latter part of 1919 and the first three months of 1920. The cost of gasoline is one important item that has gone up, 6 cents or more to the gallon since most of these data were secured, and as the general trend is upward it will be proper enough to assume that the figures are low rather than high.

## SIXTEEN HOURS A DAY MAKE A JITNEY PAY

Table I shows some of the high spots in the operation of a seven-seater in a thriving New England city. The route is exceptionally fine because there are factories at each end, the business and amusement center is half way between and a mingling of residences with factories assures well-balanced two-way travel almost every hour of the day. The operator was a South American who lived sparingly, ran his car up to sixteen hours a day, was polite to his customers in broken English and saved \$10 a day on the average for the threefold purpose of maintaining his car, paying for his bread and garlic and purchasing a \$2,100 Reo speed wagon, out of which he hoped to make a daily profit of \$15 to \$20 with fewer working hours for himself. By dint of hard work he had accumulated enough to pay the customary \$800 down and \$100 a month thereafter with interest at 6 per cent. His reason for turning to the sixteen-passenger bus was that the \$250 a year liability premium was too heavy a burden for a seven-seater, aside from the long hours of labor.

TABLE I—SEVEN-SEAT HIGH-GRADE TOURING CAR IN A NEW ENGLAND CITY

Length of run	3.7 miles
Schedule speed	16 m.p.h.
Daily fair weather earnings	\$15-\$17
Daily bad weather earnings	\$12
Saturday maximum earnings	\$20
Operates from 6:30 a.m. until late at night	
Daily gasoline cost	\$2
Daily upkeep, lubrication, repairs	\$2
Tire life	3 months
Annual license fees and markers	\$20
Liability bond per annum cost	\$250
Estimated daily profit, out of which depreciation, tires, wages and bonding would have to come	\$10

TABLE III—ONE-TON USED STEWART TWELVE-SEAT BUS IN NEW ENGLAND SUBURBAN SERVICE

Length of run (suburban)	6 miles and more
Express running time	35 minutes
Normal or local running time	45 minutes
Average fair weather intake daily	\$25
Fares—10 cents and 15 cents; some children at 5 cents	
Operates weekdays from 5:40 a.m. to 7:30 and 8 p.m.	
Operates Sundays from 1:30 p.m. to 7:00 p.m.	
Daily gasoline 12 gal. at 26 cents per gallon	
Miles per gallon gasoline	8½
Daily lubricant for 100 miles run	2 qt., 1 pt.
Daily gasoline, oil and tire charge	\$7
Daily cost of 35x5 in. tires (bad roads)	\$3
Annual bond, license, tax, etc.	\$470
Annual fire and collision insurance*	\$100

\* This is a very rare charge among jitney bus men.

TABLE II—FORD CHASSIS UNDER NINE-SEAT BUS IN A NEW ENGLAND CITY

Length of run	3.7 or 3.13 miles
Schedule speed	12 m.p.h.
Daily fair weather earnings	\$15
Daily bad weather earnings	\$10
Saturday maximum earnings	\$18
Operates from 6:30 a.m. to 10 a.m.	
11:30 a.m. to 2 or 3 p.m.	
4 p.m. to 7:30 p.m.	
Daily gasoline, oil and tires	\$5
Repairs	Self-made
Annual license fees and markers	\$20
Liability bond per annum cost	\$250
Miles per gallon gasoline	8

TABLE IV—ONE-TON STUDEBAKER INSTALLATION (THREE BUSES) IN NEW ENGLAND SUBURBAN SERVICE

Length of run, city and suburban, all smooth paving	14 miles
Running time of 45 minutes equivalent to schedule of	19 m.p.h.
Average daily earnings	\$30
Fare practically 2 cents per mile, or for 14 miles	25 cents
Minimum intertown fare	10 cents
Hours of service in combination with others	4:45 a.m.—12:50 a.m.
Daily gasoline, oil, tires and upkeep	\$11
Weekly wages of drivers, nine-hour day	\$25 to \$30
Owner's estimate of total operating expenses per mile	25 cents
Annual bond, tax, license charges per bus (exclusive of liability bond)	\$39

Table II tells the story of another satisfied operator. Until the passage of a "one-route-within-twenty-four-hour" ordinance, he had the pleasant habit of dividing his time on two routes according to the flow of traffic. On the 3.7-mile route already named he would operate from 6 a.m. to 10 a.m., lay off until 11:30, then work up to 2 or 3 p.m. on a 3.13-mile route which enjoys exceptionally good midday shopping and theater travel. After a rest to 4 p.m. he returned to the first route to carry factory workers up to 7.30 p.m. This man was an intelligent American mechanic who had studied traffic possibilities to a nicety. He was satisfied that he could bring his gross earnings up from \$20 to \$22 a day, but did not relish the extra hours this would involve. As he operated only through the best hours of the day and drove his car so carefully he did not believe it would pay him to employ a driver with so small a bus for the sake of an eighteen-hour day. While he was not sure whether he could call his vehicle a nine-seater or an eleven-seater, he pointed with pride to the fact that he had carried as many as thirty-three (highly compressible) girls. His Ford bus had cost him \$1,150, on the basis of \$415 down and \$100 a month thereafter with interest at 6 per cent. At the time these figures were obtained (January, 1920) the price would have been \$1,215. The bus was not large enough for the business, so he was going to pass it on to his brother in favor of a sixteen-passenger Reo, for which he would pay \$2,300 instead of \$2,150 (for the sake of having oversized tires), making a first payment of \$500 cash and \$300 value of second-hand equipment. He had but one complaint: That the trolley cars on one-third of the run were so thick they interfered with his schedule!

#### NON-STOP SERVICE GIVES THE JUMP IN SUBURBAN SERVICE

Table III tells some of the story of another bus operator in the same territory. In this instance operation is to a suburb and not all of the road is smooth going. By dint of hard work and many little courtesies to patrons this driver has worked up quite a personal clientèle—a condition not uncommon on suburban long-headway routes. Knowing almost to a person where his customers are to be expected, this operator does not

bother to stop for riders within the city 5-cent jitney zone, but does pick up the children of his suburban customers at 5 cents on their way to or from school when he is likely to have room for them. His running time does not represent the best that could be done with a bus. A new machine would make the same run in about ten minutes less, he said. There is not much to choose between the speed and the service of car and bus in this example, but the busmen on this route have worked out to a high degree of refinement the art of starting a minute or two before the car and thus picking up most of the waiting customers. During the rush hours, namely, 6 a.m. to 9 a.m. and 4 p.m. to 6 p.m., they have a more legitimate advantage over the trolley service in giving non-stop operation between suburb and city. If there were no trolley line, of course, there would have to be a local bus service too. In any event, the rush-hour bus, unlike the car, runs more miles instead of less during the heaviest hours. In co-ordination with the trolley service, such through bus operation would be entitled to and would get a fare higher than that charged for the local car service. In competition with the trolley, however, this is economic waste which the public must pay for in the end.

#### HARD SLEDDING FOR THE HIGHWAY TROLLEY

Table IV tells the tale of another bus route in competition with the trolley, as studied in the same territory. It is one of the rare instances where the buses are driven by employees. The owner has three machines of similar type, one of which is usually in the repair shop or in reserve. He is an expert mechanic and proud of the fact that he has obtained, in four years or more, some 250,000 miles from a 1-ton delivery type. This man had kept close tabs on his accounts. He held the opinion that his operating expenses alone amounted to 25 cents per bus-mile, or between 1.5 and 1.75 cents per seat-mile. When his other charges, such as replacement, license, bonds and taxes, are taken into consideration his margin is a very narrow one indeed. One may doubt whether his personal earnings per hour of work are any higher than if he were engaged as an expert mechanic for an employer.

However, looking at this from the selfish viewpoint

of the rider, let us make a contrast with the trolley service as follows:

The headways offered by this operator and his fellow-jitney operators are the same as those of the trolley company, namely, fifteen to forty minutes. The running time of the bus, however, averages forty-five minutes, which is some twenty minutes faster than the trolley. The latter is handicapped by the usual delays in city and village streets, in addition to which it lacks enough sidings to permit better headways of the overlapping routes than, say, ten minutes. An increase in the number of sidings and the use of light, one-man cars would probably wipe out the present kind of bus operation almost instantaneously, for even now the busman's margin is perilously small. With a 25 to 50 per cent increase in trolley mileage it would not be possible for the busmen to pursue their present trick of starting out just a minute or two ahead of the car to snap up roadway patrons. In this case such policy is particularly harmful to the trolley, because during its layover within a block from the town center on a public street the bus attracts people who have completed their business ten, fifteen or twenty minutes before the departure of the next bus or car. It is more natural that they should enter and make themselves at home

to balance the cost of track improvement and modern one-man cars against the cost of substituting a modern one-man gas or trackless trolley bus service for an obsolescing trolley system. When the public understands just what the company can do in the way of fares and service under each method and what the relative charges or benefits will be to the community it will be possible to come to a satisfactory decision.

It is possible to conceive a solution whereby the trolley service in the closer populated districts will be retained for short hauls at low rates and a non-stop bus service at higher rates be operated between the terminal cities; but one cannot conceive a solution that would permit the continuation of two competing services each of which is below par.

NARROW JITNEY MARGINS THAT CAN BE WIPED OUT BY MORE TROLLEY SERVICE

Table V presents the average actual cost of a sixteen-passenger jitney bus as determined from a study of a large number of buses in the same city. The earnings are exceptionally high, for this operation is in a city where about one-third the traffic is within 1.25 miles and more than three-fourths of the traffic within 2 miles, and on the principal routes of which the loads are beautifully balanced. Operation is for eighteen hours a day and includes some special hacking service.

It will be seen that the actual operating expenses plus overhead bring the cost of a sixteen-passenger vehicle to 18 cents a mile, leaving a margin of 2 cents a mile over and above the actual wages of the operator. In practice, however, the \$900 which this table shows as the total for a fifty-week year would be curtailed by bad weather, laying up of the bus for overhauling, etc. But the obvious fact is that the margin between wages and operating profit is a mere 2 cents per mile, which would be wiped out at once by the introduction of 25 to 50 per cent more trolley service. It follows that, despite the exceptionally favorable jitney conditions in this particular city, the only true field for an automotive vehicle is to offer short-cut rides at somewhat higher rates than the trolley instead of competing over the same streets and at a lower rate of fare.

[No account is taken of the fact that increases in gasoline and other costs since the foregoing data were secured would add 1 to 2 cents per mile.]

It is interesting to compare this example from practice with a set-up of costs issued by a manufacturer of the same general line of buses. His total of gasoline, oil, tires, repairs, insurance, depreciation (four-year basis) interest and garage worked out roughly at 9 cents a mile, with gasoline at 26 cents a gallon (now more than 30 cents). Unfortunately, no allowance was made for license, tax, bonding, jitney association membership dues, etc., which we have seen equivalent to \$400 per annum, nor is any allowance made for the \$35 a week wages or \$1,815 per year of approximately forty-nine weeks. This unavoidable addition of \$2,215 per annum is equivalent to another 7.3 cents per bus-mile on the maker's fair assumption of 30,000 miles per annum with one driver only. Adding 9 cents and 7.3 cents gives us 16.3 cents, which is not so far away from the 18 cents found in practice. Having overlooked the wage, bond, tax and similar costs, the bus maker showed the delightful result of 22 cents per bus-mile gross and only 9 cents per bus-mile for expense. In reality, only the most intensive cultivation of traffic under still more favorable conditions than the instance cited would give

TABLE V—AVERAGE COST OF OPERATING SIXTEEN-SEAT JITNEY BUS IN A NEW ENGLAND CITY WHERE EARNINGS ARE HIGH

Earnings at \$25 to \$30 a day (850 miles a week) Or, say.....	\$0 20 per mile \$170 per week
Costs per week:	
Driver for nine-hour day.....	\$35
Gasoline and oil for eighteen-hour day.....	25
Tires.....	10
Incidentals.....	5
Add:	
Owner's wages for nine-hour day.....	40
For 33 1/3% depreciation on \$2,200 bus.....	14
Interest on \$2,200 at 6%.....	2.50
\$400 per annum for taxes, license, bond, or.....	7.75
Repairs at 1 cent a mile.....	8.50
Pay for garage, starters, etc.....	6.00
Total weekly expenses.....	\$151.75
In round numbers, say \$152 for 850 miles, or 18 cents per mile.	

in the layover bus than stand on a street corner until a car for the same destination goes by.

The bus also offers a lower fare than the trolley, the contrasting rates being 25 cents against 32 cents. Up to mid-October, 1919, the bus charged 20 cents. In all probability the busmen could charge more than the trolley rather than less and be better off. Their service is worth it. Indeed, the absence of the "selling transportation" spirit when the present trolley cars were bought is proved by the condition that the uncomfortable longitudinal seat should be standard for a 14-mile ride. A cross-seat bus of more liberal dimensions would simply run away with the business.

As the public is getting more service and better speed than ever before, it is hardly in the mood to listen to any additional taxation of the buses, such as a road-maintenance charge. On the other hand, here is the trolley line monopolizing one-fourth to one-third the width of a state highway with ever-increasing automotive traffic. The automobilist is already looking with longing eyes toward the unpaved strip used by the relatively occasional trolley car. A few years more and he will be clamoring loudly that the principle of the greatest good for the greatest number demands the paving of the right-of-way strip and the practical abolition of the trolley.

Looking at this matter then in a cold-blooded, practical way, it is up to the electric railway management

a gross earning as good as 20 cents per bus-mile, while the cost of operation and overhead necessarily advances with the age of the vehicle, aside from recent increases in gasoline and other supplies.

For all that, there will always be plenty of men to take a chance in an individual business even if nothing more than bare wages result. Knowing this, some bus manufacturers sell their machines on the basis of 20 per cent down and installments of \$100 or so a month with interest at 6 per cent. They have nothing to lose, for if the first buyer does not make good they can resell the machine as a used car and still show a profit. Railway companies, therefore, should not lull themselves to blissful sleep because of repeated demonstrations that jitney bus operation is of doubtful profit to the jitneur. They must make it a point to give a character of service, both car and motor bus, that will kill the snake in the shell.

#### THE STORY OF A WELL-RUN JITNEY BUS COMPANY

Generally it is quite out of the question for a jitney bus company to operate as carefully and efficiently as the individual jitney operator. The writer, however, has studied the workings of one such concern whose methods in some respects are worth the earnest attention of electric railways which are contemplating motor bus operation. The high spots of its operation are shown in Table VI.

The company is now operating on half a dozen routes twenty to thirty motor buses, all with Day-Elder chassis with bodies fitted chiefly with railway type rattan cross-seats, to give a capacity of twenty-three. The interior

is roomy and much better lighted than the usual jitney bus. Attention has also been given in the arrangement of door, step and seating to make ingress and egress comfortable, safe and rapid. The vehicles are attractive and are kept in excellent condition. The downtown starter acts also as an inspector to correct minor troubles and forestall major ones.

Employees are not uniformed, but appear to be courteous and skillful. Their wage is below that of the local street railway, but actually a good driver earns more, as he receives 5 per cent of all gross earnings shown by his farebox as a bonus. This appears to be a real stimulus to the men to go after business. The company is also planning to pay \$100 to each man who completes a year's service without accident. There is considerable democracy of management, the men themselves deciding upon the rotation of their runs, which they seem to prefer upon the basis of alternating "earlies" and "lates." As there are two shifts to a bus, every vehicle is kept out for eighteen hours a day. This arrangement permits the bus company to rent out its garage facilities, located near the business center, for storage and inspection of private machines. Hence it may be said that garage expense is practically nil.

Competition with the electric railway is direct, inasmuch as the buses run over the same routes and at fares of 5 and 10 cents against 6 and 12 cents. On one of the best-traveled routes the over-all bus ride is only 2.5 miles. The bus has no noticeable advantage in local frequent-stop operation, but during rush hours it makes through runs between terminals at a great saving in time over the electric cars, which cannot do any leap-frogging. Pneumatic tires are used as being more pleasing to the rider. On this point it may be worth remarking that habitual jitney riders invariably prefer the pneumatic-tired vehicle, although a solid-tired vehicle may be ahead in the line-up. For that reason, operators who begin with solid tires go to pneumatics eventually.

This bus company has the advantage of operating in a highly industrialized section with an unusually good load factor, although not the equal of the city previously described. Up to the present time its gross earnings have been high enough to show an apparent profit over the operating and fixed expenses, which must be on the order of at least 25 cents per mile, judging from the company's own estimates and the estimates of the chassis builder. It must not be forgotten that a large proportion of the riders pay 10 cents for rides between 2.5 and 4 miles, that taxes are negligible and that the management is efficient and popular. In this case the one-man bus is still holding its own against the two-man car, but whether it will hold its own against shorter-headway, lightweight, one-man car operation is much to be doubted. The proper place for this type of service would be in co-ordination instead of competition with the electric railway, for the rush-hour through-service feature is but one of many advantages that could be developed to a greater degree than at present.

#### ELECTRIC RAILWAYS SHOULD NOT COMPETE WITH THEMSELVES

From the review of the operations of jitney men and jitney companies, we may now pass to the motor bus operations of electric railways, which have gone through a peculiar development and which are still in a state of flux.

It will be recalled that when the jitney plague de-

TABLE VI—OPERATING COSTS OF A JITNEY BUS COMPANY USING DAY-ELDER CHASSIS WITH 23-PASSENGER BODY

Length of run up to 5 miles over smooth, granite and cobblestone paving	
Schedule speed of local service	10 m.p.h.
Non-stop rush-hour service approximately	13 m.p.h.
Fares 5 and 10 cents, against 6 and 12 cents on trolley	
Annual charges for bonding, license fees, taxes	\$500
	Per Bus-Mile
Estimated cost of pneumatic tire upkeep	5.5 cents
Estimated cost of gasoline, 6 miles per gallon and gasoline at 25.5 cents per gal.	4 25 cents
Wages one-man bus 50 cents an hour at 10 m.p.h.	5 00 cents
Wages of supervisory staff, say 20% of platform	1.00 cent
Inspection, repairs, etc.	Too early to figure

#### MANUFACTURER'S ESTIMATE

(Courtesy of Lang-Warden Motors, Inc., New York)

Day-Elder 1.5 to 2-ton chassis with twenty-three-seat bus, extra pair of tires, war tax, freight, etc., approximately	\$4,729 00	
Fixed Expenses:	Per Annum	
Interest on investment (\$4,729) at 6%	\$283.74	
Overhead, and repairs twice a year	500 00	
Garage rent	360.00	
Drivers, two at \$30 each for fifty-two weeks	3,120 00	
Total fixed expenses	\$4,263 74	
Operating expenses:	Per Bus-Mile	
Tires, based upon 8,000 miles guarantee	\$0 05952	
Gasoline, 12 miles per gallon at 27 cents	02250	
Oil, 150 miles per gallon at 60 cents	00400	
Grease	00100	
Depreciation, based upon 100,000 miles	04729	
Total	\$0 13431	
Recapitulation:	Per Bus-Mile	Per Annum
Fixed expenses for 150 miles a day for 300 days or for 45,000 miles per annum, costing \$4,263.74	\$0.09475	\$4,263.74
Operating expenses for 150 miles a day for 300 days	.13431	6,043.95
	\$0.24906	\$10,307.69
Approximate over-all cost, exclusive of bonding, license fees, taxes	25 cents per bus-mile	

#### NOTES

Manufacturer's service or maintenance plan for one year covers semi-monthly inspection, which includes tightening of all nuts, greasing of working parts, readjustments, detail report of condition to owner, etc., without cost, except for lubricants.

Foregoing estimate assumes wholesale operation with, say, 15 per cent reserve. Hence the individual bus is treated as if in daily use throughout year on two-shift basis.

Garage rental is based upon large city operation and would be less in medium-size cities.

Estimated gasoline consumption is considerably higher than actual operation over highways including much rough paving.

TABLE VII—OPERATION OF FLEET OF 1.5—2-TON WHITE CHASSIS WITH SIXTEEN-SEAT SUBSTANTIALLY BUILT BODY AS OPERATED BY AN EASTERN ELECTRIC RAILWAY

Length of run, approximately	2.5 miles
Service given from	7 a.m. to 12 midnight
Schedule speed averages	7.75 m.p.h.
Transportation earnings per bus-mile, with 6-cent fare, approximately	35 cents
Cost of bus, exclusive of heaters, fare box, etc.	\$6,100
Weight of bus, 6,970 lb., or	436 lb. per seat
Annual performance per bus, approximately	18,000 miles
<b>Operating Expenses:*</b>	
Maintenance of Equipment: Cents per Bus-Mile	
Superintendence	0.58
Chassis repairs	3.10
Body repairs	0.81
Tire upkeep and renewals (28,000-mile solid)	1.60
Shop expenses and accessories	0.26
Depreciation (25 per cent per annum)	6.60
	12.95
Conducting Transportation:	
Superintendence	0.58
Platform wages (one man, 46 cents an hour)	7.50
Dispatchers and street supervision	1.14
Garage employees and expenses	0.92
Service-car expenses	0.13
Cleaning and oiling	1.20
Gasoline (4.6 miles per gallon)	5.70
Lubricating oil	0.11
	17.28
General and Miscellaneous:	
Salaries general officers and clerks	0.96
Miscellaneous office expenses, printing, etc.	0.31
Injuries and damages	2.11
Insurance	0.53
Stores and miscellany	0.39
	4.30
Total operating expenses, including depreciation	34.53
Fixed Charges:	
Interest and discount	4.10
Taxes	1.60
	5.70
Total operating and fixed charges	40.23

\* The following costs are not absolutely exact, owing to certain changes arising during the fiscal year, but they are accurate within a cent or two per mile over all.

sceded upon the United States in 1914 and after, several electric railways undertook a little jitney operation *sub rosa* to see what was in the gassed thing. Thus arose the odd spectacle of a railway competing with itself as well as with the interloper. It was expensive business, and usually a few weeks were enough to convince the electric railway that it couldn't run a jitney as cheaply with hired men as the man who owns or rents and repairs his own car. Here and there, however, the jitney developed into a more legitimate bus service openly conducted by the railway. One of these, which is deservedly popular, is in operation in a large Eastern city. Unfortunately, it is still being run at street railway fares and it has not yet been rerouted sufficiently to serve the twofold purpose of less poaching on the railway service and a faster, more direct run between terminals. At 5 and 6-cent fares these buses lost money. At 7 cents they threaten better results on a route a little more than 2.9 miles long. Table VII shows that these sixteen-seat motorbuses cost 34.53 cents per bus-mile. The depreciation item is rather liberal for this make of chassis. On the other hand, no charge was made for garage rental or for management. The table also indicates that the buses are not routed to secure free running, as their schedule average of 7.75 m.p.h. (aside from idle miles constituting a further loss) is certainly low for a vehicle of such small capacity and results in higher platform cost and lower bus-hour intake. The earnings of 35 cents per bus-mile were not enough to carry operating expenses and overhead.

The legitimate field for a service of the foregoing character would be as an alternative higher-fare route to relieve a nearby congested car street, thereby assuring higher schedule speed for the bus and some measure of relief to the cars.

In the heyday of electric railway construction in America there were built a great many extensions into open country under pressure from real estate or amusement park interests. Many of these extensions continue

a loss down to the present day, while the most promising of them required years and years to reach the stage where revenue exceeded expenses.

BUSES POSTPONED COSTLY TRACK EXTENSIONS

In the following discussion of the San Francisco bus operations, as well as other bus services, it will be seen that such costly track extensions can now be avoided through the inauguration of a motor bus service. It would be unfair to expect the motor bus to show a profit for such pioneering in thin territory, especially when it is treated as part of a universal-fare street railway system. All that can be justly expected is that it should handle this thankless class of business at a lower over-all cost than would be possible with an electric railway. It would be difficult to make most of these extension routes self-supporting in any case, but it may be respectfully suggested that the users of such facilities be assessed an additional increment of fare, whether it be 2, 3 or more cents per mile. Such a plan is fairer than that of favoring still further the passenger who rides to the very end of the trackway!

Tables VIII, IX and X tell the operating tale of the service given with White motor buses, first on four, then on three and now on two extensions of the San Francisco Municipal Railway. These routes are described in Article II of this series, so that it is only necessary to recall that Route 1 is a twelve-minute headway extension across Golden Gate Park, the trolley route being 4.8 miles and the bus extension 2.08 miles long, and that Route 2 is a fifteen-minute headway extension along Great Highway (ocean shore), the trolley route being 7.06 miles and the bus route 1.12 miles long. Route 3, discontinued April 12, 1919, had a ten-minute headway, and it was possible on it to get a 6.04-mile trolley ride and a 1.70-mile bus ride for 5 cents, as on the other routes. Route 3 in itself was a consolidation of Routes 3 and 4 made to reduce losses.

Under the circumstances, it would be hopeless to expect a profit from a motor bus service. Thus, in 1918, the total receipts from motor bus operation after due allowances were but \$27,479.40, whereas the cost, despite no tax or license charges, was \$53,817.61, leaving

TABLE VIII—OPERATION OF WHITE 2-TON MODEL TDB CHASSIS WITH NINETEEN-SEAT BODY (7,830 LB., OR 412 LB. PER SEAT LIGHT) USED BY SAN FRANCISCO MUNICIPAL RAILWAY, CALENDAR YEAR 1918

(Figures courtesy of the White Company, San Francisco Office)

Investment:	
Five-Model TDB White truck chassis f.o.b. San Francisco at \$4,255...	\$21,275.00
Five motor bus bodies at \$2,000	10,000.00
Total investment	\$31,275.00
Estimated Cost of Operation, including Fixed Charges:	
Interest on investment at 6%	\$1,876.50
Insurance on fleet of five cars as follows:	
Fire and theft	\$350.28
Public liability	250.00
Property damage	100.00
Collision	652.50
Employers' liability	675.00
	\$2,027.78
Licenses (exempt)	
Taxes (exempt)	
Storage	300.00
Actual fuel consumption, 47,352 gal. distillate at 10 cents*	4,735.20
Actual oil consumption, 4,128 gal. at 29 cents	1,197.12
Actual tire cost, 294,889 miles at 6.5 cents per mile	19,167.78
Repairs—Labor and parts	3,125.82
Actual wages of drivers (50 cents an hour)	15,132.41
Depreciation at 20 per cent per annum	6,255.00
Total cost	\$53,817.61
NOTE: Repairmen's wages	68.75 cents an hour
Cleaners' wages	56.25 cents an hour
Machinists' wages	\$1.00 an hour
Total number of passengers carried	1,023,298.00
Receipts from motor bus operation	\$27,479.40
Loss on motor bus operation (estimated)	\$26,338.21
Total cost per bus-mile	18.25 cents
Distillate consumption, 6.2 miles per gallon.	
* Unsatisfactory; to be replaced by straight gasoline.	

a deficit of, say, \$26,338. The cost of operation per bus-mile, including the overhead as detailed in the table, was 18.25 cents. Inasmuch as there were no license, tax or management charges, it will be seen that the cost of these nineteen-seaters must have been at least 1 cent per seat-mile. California wages, it will be observed, are high, whereas fuel is much less. The use of the more comfortable pneumatic tire enhances the tire charge.

Table IX shows that advancing costs in 1919 raised the expenses per bus-mile to 23.6 cents, whereas the earnings per bus-mile were but 12 cents. In this case the net loss on this accommodation service was \$30,-124.05. In January, 1920, receipts were 12.6 cents and outgo 27.3 cents per mile. Part or all of this loss may have been recouped by the city of San Francisco through the enhancement of suburban realty values, but this kind of set-off is not open to a privately owned electric railway.

OFFICIAL COMMENT ON SAN FRANCISCO BUS OPERATION

Through the kindness of F. Boeken, superintendent San Francisco Municipal Railway, further data (Janu-

applies to the bus drivers and the \$2.49 rate to the shop mechanics.

Hitherto the buses have been using a mixture of gasoline and distillate in the ratio of two to one, but owing to the difficulty experienced in starting and because of the tendency to carbonize straight gasoline will prevail hereafter.

Up to April 1, 1920, five of the buses had been in operation for twenty-seven months (from January, 1918) and the sixth bus just twelve months. Up to Dec. 31, 1919, the first five buses had averaged 110,000 miles each. By the second year's operation maintenance had increased to the point where one of the five machines was always in the shop. In order to maintain the schedules, the city has ordered two more buses, which, like the others, will have White chassis.

Finally, Mr. Boeken's statement on the transportation value of the motor bus may be quoted verbatim:

"These bus lines are operated in an outlying, sparsely settled district and serve as temporary extensions of the Municipal Railway's main lines. While the experience with these buses has, to a certain extent, been costly to the Municipal Railway, they have served as a means

TABLE IX—OPERATION OF SAN FRANCISCO MUNICIPAL RAILWAY BUSES FOR CALENDAR YEAR 1919

(Courtesy the White Company)

Receipts Route 1.....	\$13,341.85	
Receipts Route 2.....	7,229.50	
*Receipts Route 3.....	2,276.05	
Receipts total.....		\$22,847.40
Operating Expenses:		
Repairs to buses owned.....	\$12,357.57	
Platform expenses.....	16,360.90	
Garage expense.....	11,446.84	
**Rental of buses.....	592.50	
Tire expense, varying from 5.5 to 7.5 cents per bus-mile.....	16,143.10	
Total operating expense.....	\$56,900.91	
Operating loss.....	\$34,053.51	
Reserves:		
Depreciation (18% of receipts).....	\$4,112.53	
Compensation insurance.....	529.16	
Total reserves.....	4,641.69	
Total operating and overhead expenses.....	\$61,542.60	
Gross excess of expense over revenue.....	\$38,695.20	
Revenue Credits:		
Comprising 5-cent tickets, 2½-cent school tickets and transfers credited at 2½ cents each.....	8,571.15	
Net loss.....	\$30,124.05	
Total bus-miles.....	260,324	
Receipts per bus-mile, exclusive of credits.....	\$0.188	
Receipts per bus-mile, inclusive of credits.....	.120	
Expenses per bus-mile, including overhead.....	.236	
Net loss per bus-mile.....	.116	

\* Route No. 3 discontinued April 12, 1919.  
\*\* Rented bus discontinued March 21, 1919.

TABLE X—OPERATION OF SAN FRANCISCO MUNICIPAL RAILWAY BUSES JANUARY, 1920

(Courtesy F. Boeken, Superintendent)

Receipts Route 1.....	\$1,272.05	
Receipts Route 2.....	529.30	
Total receipts.....		\$1,801.35
Operating Expenses:		
Repairs to buses owned.....	\$1,532.16	
Platform expenses.....	1,329.15	
Garage expense.....	1,004.06	
Total operating expenses.....		3,865.37
Operating loss.....		2,064.02*
Reserves:		
Depreciation (18 per cent of receipts).....	\$324.24	
Compensation insurance (\$1.99 on \$1,700.50 and \$2.49 on \$955.95, or \$33.84 and \$23.80, respectively).....	57.64	
Total reserves.....		\$381.88
Gross excess of expense over revenue.....		\$2,445.90*
Revenue Credits:		
Comprising a few 5-cent tickets, with school tickets and transfers credited at 2.5 cents each.....	\$666.45	\$666.45
Net excess of expenses over revenue.....		\$1,779.45**
Tire Expense:		
19,510 miles at 5.5 cents.....	\$1,073.05	
Net loss, tire expense included.....	\$2,852.50	
Daily net loss, tire expense included.....	92.02	
* After crediting bus lines with proportionate transfers and tickets.		
Total bus-miles.....	19,510	
Receipts per bus-mile, exclusive of credits.....	\$0.092	
Receipts per bus-mile, inclusive of credits.....	.126	
Expenses per bus-mile, including overhead.....	.273	
Net loss per bus-mile.....	.147	

ary, 1920) and the following general facts have been made available:

Mr. Boeken says that January may be considered an average month (this being the Pacific Coast) so far as bus performance goes. Table X shows each bus in service averaged 158 miles daily, but 180 miles a day is nearer the usual performance. Two other buses were in the shop for repairs during this month, so that the actual mileage per bus owned would have to take this 33½ per cent reserve into account.

The total cost of these six buses, delivered and ready to operate, is placed at \$34,345.05. Experience has shown that owing to the very small revenue per mile earned by these suburban buses the setting aside of 18 per cent of the cash receipts (14 per cent for depreciation and 4 per cent for injuries and damages, as in the case of the electric cars) is not sufficient to cover depreciation. The compensation insurance item in these tables is a fund set aside for the care of injured employees, in compliance with State law. The \$1.99 rate

of transportation for some people who heretofore have been without any transportation. They have also saved the Municipal Railway the expense of building unprofitable extensions. Still, I do not feel that our experience could be considered as a criterion in judging the merits of motor bus transportation as compared with street cars. However, I do not believe that motor bus transportation will ever entirely supersede the electric street railway unless some style of bus is developed along lines different from any so far tried out in this country."

TROLLEY CAR LOSSES WOULD HAVE BEEN GREATER ON SAN FRANCISCO EXTENSIONS

That Mr. Boeken is right in assuming that trolley car operation would have led to greater losses will be obvious from a brief calculation. The total length of route operated early in 1919 with motor buses approximated 5 miles. At a construction cost of \$70,000 per mile, or \$250,000 total, the fixed charges on the permanent way would have cost 6 per cent of \$350,000, or \$21,000 per

TABLE XI—OPERATION OF FOUR STUDEBAKER SIXTEEN-PASSENGER MOTOR BUSES FORT WAYNE, IND., MARCH 15 TO DECEMBER 31, 1917, INCLUSIVE

(Courtesy Sam W. Greenland, General Manager)

Connection made between two trolley routes one mile apart in residential district:		
Cost of four buses.....	\$5,861.00	
		Cents per Bus-Mile
Mileage.....	93,012	
Gross revenue.....	\$5,345.23	5.75
Total cost, operation and overhead.....	11,240.00	12.084
Detail of Expenses:		
Repairs (Labor and material).....	1,344.45	1.445
Front tires.....	279.43	0.300
Rear tires.....	682.40	0.734
Tire repairs.....	84.53	0.091
Lamps.....	8.34	0.009
Battery repairs.....	53.91	0.058
Cleaning.....	47.57	0.040
Gasoline and oil.....	2,543.02	2.734
License fee.....	74.00	0.080
Liability bond.....	80.00	0.086
Depreciation.....	2,950.00	3.172
Driver's wage.....	3,102.35	3.335

TABLE XII—OPERATING STATEMENT FOR SIX MONTHS OF 1919 FOR ONE-TON MORELAND MOTOR BUS, FRESNO TRACTION COMPANY

(Courtesy F. W. Webster, General Manager)

Service.....	Feeder to electric line
Fare.....	6 cents, transfers free
Operating revenue, including \$51.48 of 2.5 cent tickets.....	\$1,369.38
Operating Expenses and Overhead:	
Maintenance supplies.....	\$79.23
Maintenance labor.....	132.78
Salaries.....	1,254.26
Gasoline and oil.....	.....
Depreciation.....	457.86
Rent of equipment.....	505.20
Miscellaneous.....	21.25
	<hr/>
	\$2,450.58
Net loss from operation.....	1,081.20
Interest on investment—6 months at 6%.....	144.96
Total loss for six months.....	1,226.16
General Data:	
Cash passengers.....	21,965
Transfer passengers.....	27,705
Ticket passengers.....	2,055
Passengers carried.....	51,275
Miles operated.....	10,044
Average earnings per mile.....	\$0.1363
Average expenses per mile.....	\$0.2439

annum. The most economical operation, of course, would be with safety cars. In 1919 six such cars would have cost delivered about \$36,000, which at 6 per cent interest would have added \$2,160 a year to the fixed charges. It may be assumed that the cost of safety car operation, covering the usual operating accounts (way and structure, equipment, power, conducting transportation, traffic, general and miscellaneous), would have been 18 cents per car-mile. As the total revenue per vehicle-mile was but 12 cents, safety car operation costs would fall short 6 cents per car-mile, or \$18,000 per annum, on the basis of 300,000 car-miles on three routes. Adding this deficit of \$18,000 to the overhead charges of \$21,000 on permanent way and \$2,160 on rolling stock gives a total deficit of \$41,160. To this total we must add \$6,480 a year, or 18 per cent of the receipts (which may be placed at 12 cents on 300,000 miles, or \$36,000), plus another \$530 for compensation insurance. The grand total then will be \$48,170 per annum, or a deficit of 16 cents per car-mile. This compares with 11.6 cents deficit per bus-mile on the basis of the 260,324 bus-miles actually run. In all probability the losses with electric railway operation would have been greater rather than below the estimate made. The fact that the car service would offer almost twice as many seats is of no significance, as the need for such capacity has not arrived. If the buses, then, failed to make money in this thankless work, they certainly lost less than a trackway.

FORT WAYNE HAS HAD TO CUT OFF ALL UNPROFITABLE SERVICE

Table XI shows the intake and outgo of four Studebaker sixteen-passenger buses which were operated from March 15 to Dec. 31, 1917, by the Fort Wayne & Nor-

thern Traction Company, Fort Wayne, Ind., to give crosstown service between two trolley routes 1 mile apart. The route was through a residential district, with little opportunity for other than transfer riding. This is indicated by the fact that the revenue was but 5.75 cents per bus-mile, whereas the operating and overhead charges then totaled 12.084 cents per bus-mile. Of this amount per bus-mile 3.172 cents was charged to depreciation. In view of the fact that this company is in receivership, it is not remarkable that it has discontinued this costly accommodation for the same reason that it is taking up unprofitable amusement park trackage.

EXTENSION SERVICES AT FRESNO, PALO ALTO AND SAN JOSE, CALIFORNIA

Table XII is an operating statement for six months of 1919 of a one-ton Moreland motor bus run by the Fresno Traction Company as a feeder. To use the succinct phrase of F. W. Webster, general manager of this company: "For financial result, see attached statement." The high spots are an over-all expense of 24.39 cents per mile (exclusive of fuel and oil), against a revenue of 13.63 cents per mile. The average revenue per passenger was only 2.67 cents, for 27,705 passengers rode on transfers.

Table XIII details the story of four months' operation in 1913 of a bus feeder line by the Peninsular Railway between Palo Alto, Cal., and the army camp at Fremont. The fare of 10 cents included transfer privileges to or from Palo Alto city cars. F. E. Chapin, general manager, advises that in operating this line it was found that the overloading during certain times of the day had a far more disastrous effect on the equipment than it would have had on ordinary electric motors.

TABLE XIII—OPERATION IN 1913 BY PENINSULAR RAILWAY OF BUS FEEDER LINE BETWEEN U. S. ARMY CAMP AT FREMONT AND PALO ALTO TO CONNECT WITH PALO ALTO CITY CARS AND INTERURBAN CARS FOR SAN JOSE

(Courtesy F. E. Chapin, General Manager)

Fare each way with transfer privilege to or from Palo Alto city cars... 10 cents  
 Equipment—One 2-ton Moreland truck converted to thirty-eight-seat bus and one 40-hp. Faggl auto bus seating eighteen.  
 Operation over paved highways.

Operating Statement First Four Months of 1913

Month	Ex-penses	Reve-nues	Loss	Miles Run	Earnings, Bus-Mile	Average Expense Bus-Mile
January.....	\$400.85	\$152.00	\$248.85	1,280	11.88	31.32
February.....	500.81	444.35	56.46	2,709	16.40	18.48
March.....	637.40	508.20	129.20	2,995	16.96	21.28
April.....	521.87	87.70	434.17	1,129	7.77	46.22

NOTE.—Expenses include only items of cost connected with the buses, such as material, supplies and labor for repairs, wages of drivers, gasoline and oil, depreciation and miscellaneous items connected with operation. Expenses do not include any overhead charges, such as superintendence, advertising, cost of tickets, injuries and damages, nor interest on investment.

TABLE XIV—OPERATION BY SAN JOSE RAILROAD OF BUS FEEDER LINE DAILY ON HOBSON STREET AND ON MONTEREY ROAD ON SUNDAYS AND HOLIDAYS

(Courtesy F. E. Chapin, General Manager)

Fare on Hobson Street with city car transfer privilege..... 6 cents  
 Fare on Monterey Road with city car transfer privilege..... 10 cents  
 Equipment—One 1-ton Ford truck converted to twelve-seater  
 One 40-hp. Faggl auto bus seating eighteen.  
 Operation over paved highway on Monterey Road and on gravel and waterbound macadam on Hobson Street.

Operating Statement Last Five Months of 1919 and January, 1920

Month	Ex-penses	Reve-nues	Loss	Miles Run	Earnings, Bus-Mile	Expenses, Bus-Mile
August.....	\$474.84	\$117.90	\$356.94	2,035	\$5.79	23.32
September.....	525.41	86.63	438.78	2,003	4.33	26.23
October.....	556.25	111.01	445.24	2,036	5.45	27.32
November.....	577.36	110.91	466.45	2,030	5.43	28.44
December.....	497.66	98.07	399.59	2,036	4.82	24.44
January.....	730.15	88.46	641.69	2,036	4.34	35.86

NOTE.—Expenses cover same items as in Table XII.

The buses were also more stuffy and disagreeable when it was necessary to inclose them during wet weather than is the case with the more substantial and more spacious electric car. The extremely low density of traffic is indicated by the fact that a 10-cent fare brought only a maximum of 16.96 cents per bus-mile.

Table XIV shows the operation by the same management of a bus feeder service at San José, also in connection with the city car transfer privilege, except that a 6-cent fare prevails on the route operated weekdays and a 10-cent fare on the route operated on Sundays and holidays. A maximum earning of 5.79 cents per bus-mile indicates the starvation character of this service. As a matter of fact, Mr. Chapin advises that his company secured permission to abandon two wornout, remote and unprofitable narrow-gage lines only on con-

by the New York Transportation Company. The latter company in turn is controlled through stock ownership by the Interborough-Consolidated Corporation, which holds either directly or indirectly, through certain directors, about 57 per cent of the 235,000 \$10 shares outstanding. For the greater part of its motor bus life, in fact, the Fifth Avenue Coach Company has been controlled by the predominant traction interests of old New York. It is important to bear this fact in mind for two reasons: First, it accounts for the development of the bus business on a frankly supplementary rather than on a competitive basis; second, the backing of the company was powerful enough to prevent the entrance of competitors who, it may be said, had a rather rosy idea of the profits of the company.

In the early days of the company routes and rides

TABLE XV—REPORT OF FIFTH AVENUE COACH COMPANY, NEW YORK, FOR FISCAL YEAR ENDED JUNE 30, 1919

TABLE XVI—VARIATIONS IN REVENUE AND EXPENSES IN CENTS PER BUS-MILE, FIFTH AVENUE COACH COMPANY, 1913-1919, FISCAL YEARS ENDED JUNE 30

(Preliminary Report to Public Service Commission)

Number of passenger buses owned at close of year.....	279	
Average number of passenger buses operated.....	233	
Bus-hours.....	1,002,006	
Bus-miles (including 125,551 idle miles).....	8,002,026	
Schedule speed.....	8.2	m.p.h.
Net mileage per hour.....	7.98	m.p.h.
Passengers carried at 10 cents each.....	36,488,447	
	Total	Per Bus-Mile,
		Cents
<b>Income Statement:</b>		
Total fares (46.21 cents per active miles).....	\$3,648,845	45 12
Livery service (65,101 miles).....	53,659	0 66
Advertising and miscellany.....	40,194	0 50
Total revenue from operation.....	\$3,742,697	46 28
<b>Maintenance:</b>		
(Superintendence \$44,290; shop expenses \$18,131)....	\$62,421	0 77
Repairs (bus bodies and chassis, \$283,556).....	299,626	3 71
Tires (solid).....	76,595	0 95
Depreciation.....	82,503	1 02
Conducting transportation.....	1,591,640	19 68
Accidents and damages.....	103,682	1 28
Traffic—advertising.....	8,766	0 11
General and miscellaneous.....	122,360	1 51
Total operating expenses.....	\$2,347,594	29 03
Taxes.....	486,790	6 02
Total revenue deductions.....	\$2,834,384	35 05
Income from operation.....	\$907,553	11 22
Non-operating income.....	42,168	
Gross income.....	\$949,721	
<b>Income Deductions:</b>		
Rent.....	\$78,540	
Interest.....	27,225	
Total.....	\$105,763	
Net income for year.....	\$843,958	
Surplus adjustments.....	228,061	
Net surplus.....	\$615,897	

Year	1913	1914	1915	1916	1917	1918	1919
Total revenue from operation.....	42.51	38.93	35.12	33.48	38.21	33.91	46.28
Operating expenses, including taxes.....	35.05	32.20	24.49	23.37	27.68	29.01	35.05
Gross income from operation.....	7.46	6.73	10.63	10.11	10.53	4.90	11.23

TABLE XVII—VARIATIONS IN PRINCIPAL OPERATING ITEMS, IN CENTS PER BUS-MILE, FIFTH AVENUE COACH COMPANY, 1912-1919, FISCAL YEARS ENDED JUNE 30

Year	1912	1913	1914	1915	1916	1917	1918	1919
Conducting transportation.....	17.56	18.25	18.88	11.47	12.22	15.32	16.32	19.68
Maintenance of plant and equipment.....	10.37	12.83	9.40	6.75	6.47	6.45	6.43	6.44
Of which tires cost.....	3.13	.....	.....	.....	.....	0.79	0.82	0.95
Maintenance of bus equipment.....	7.21	10.02	7.48	5.47	4.59	3.50	3.19	3.70
Depreciation.....	*5.31	2.81	1.92	1.28	1.88	1.25	1.72	1.02
Taxes.....	2.70	2.50	2.50	2.23	2.02	2.79	3.48	6.02

\* In 1912 depreciation was given as 33½ per cent. per annum. Estimate for 1920 fiscal year is 1.9 cents per bus-mile.

NOTE.—“Maintenance of plant and equipment” includes superintendence, repairs of buildings and structures, repairs of shop tools and machinery, shop expenses, repairs of omnibus bodies, material and labor; repairs of omnibus chassis, material and labor; depreciation of tires, repairs of service cars, depreciation of equipment, depreciation of shop tools and machinery.

dition that it run this bus service until the expiration of the original franchise period. Here is a hint to others who are operating a long stretch of desert track!

In view of the extraordinary jitney bus development in California, it is also interesting to add that more than two years ago Mr. Chapin operated an auto bus connecting with the cars at Bascome and running to Los Gatos via Campbell, a distance of about 8 miles over a route different from that taken by the electric cars. This route proved no more successful than the service detailed in Tables XIII and XIV and was given up.

While the bus services conducted by Mr. Chapin were (or are) obviously too thin for any kind of commercial transportation, it may be interesting to quote his statement: “Our experience has been proved that the electric service is more dependable and comfortable to the passengers and can be performed more economically than service by auto bus.”

WHAT FIFTH AVENUE BUSES ARE DOING

The pioneer motor bus company in the United States is the Fifth Avenue Coach Company, which is controlled

were very short and earnings per bus-mile were correspondingly high, but the fly in the ointment was the lack of a dependable gasoline vehicle. In later years a high standard of excellence has been attained in reliability of service and traffic has grown enormously with the extensions of the routes, but the rate of fare, fixed by statute, remains at 10 cents in the face of higher wages, higher fuel and other increases in expense. Thus John A. Ritchie, president of the company, testified on May 16, 1919, before the Illinois Public Utilities Commission that the uncontrollable increases in expenditure for the twelve months ended March 31, 1919, because of higher labor, advances in material and war taxes, amounted to \$483,000, reducing the possible net earnings from \$1,100,000 to an actual net earning of \$686,000.

A more comprehensive idea of this company's operations is obtainable from its annual reports to the New York Public Service Commission of the First District. Table XV shows the report for the fiscal year ended June 30, 1919, the best in the history of the company. The *de luxe* character of the service is indicated by the



fact that these forty-eight seat double-deck buses averaged 4.5 passengers per bus-mile. The total earnings per bus-mile from all sources were 46.27 cents, operating expenses exclusive of taxes were 29.03 cents and operating expenses inclusive of taxes were 35.05 cents. Income from operation was 11.22 cents, or \$907,553.08. The net surplus was \$615,897.06.

If this had been a regular kind of year, one could justly conclude that double-deck, two-men motor bus operation at a flat fare of 10 cents was a glorious bonanza. This is not so. The surplus quoted looks very good, but it is also a fact that on June 30, 1912, the company had a deficit of \$416,977.82. From that year onward the deficit was reduced and turned into a surplus. However, a glance over the intervening years, as presented in Tables XVI and XVII, will disclose how much the prosperity of a *de luxe* bus company depends upon weather conditions or upon occasions that influence the amount of transient traffic.

The year ended June 30, 1919, produced the top earnings of 46.27 cents a mile for two outstanding reasons: A mild, practically snowless winter, which permitted riding on the open top deck almost every day; an extraordinary amount of visitors' patronage, due to the return of hundreds of thousands of soldiers via the port of New York, and the peace-time festivities and the arrival of friends and relatives to greet the incoming soldiers. In contrast, we have the preceding year, when the gross earnings were but 33.91 cents a bus-mile because of a bitter winter. These fever-chart fluctuations are very different from the customary steady annual rise in electric railway gross earnings. They prove that the profit-bringing part of the bus clientele is made up of casual rather than regular riders. There are, of course, a considerable number of natives who like to ride the open top deck in fair weather, but "when the breezes blow, they generally go below" into the nearby subways or make use of the closed surface cars. The winter of 1919-20 must have been the worst in the history of the company, and its effect will certainly be reflected in the report for the current fiscal year. The fact that the company operates over the show street of New York was a bit of good luck, because the city made strenuous efforts to clear it as quickly as possible, although the bus company also did its best.

The bus-mile figures given in Tables XVI and XVII are not absolutely exact because the preliminary annual reports submitted to the commission are made up differently from the long-delayed annual reports as corrected for final publication by the commission. They are close enough, however, for all practical purposes. As previously noted, the total operating revenue per bus-mile has been extremely variable, ranging from 33.48 cents in 1916 to 46.27 cents in 1919. If we make a non-equated average of the figures from 1913 to 1919 inclusive we get 38.35 cents, which would leave only a margin of 3.30 cents over the operating expenses and taxes. The continued prosperity of the company therefore is predicated on no further advance in cost or else a higher earning per bus-mile through higher rate of fare, preferably by zoning.

#### POSSIBILITIES OF COST INCREASES

As to the probability of no further advance in cost, the actual case is that there must have been a big advance in cost over the high figures for the last fiscal year. Wages were advanced 20 per cent or more early

during the current fiscal year, and gasoline, aside from other items, has seen several increases in price. A 20 per cent increase in the payroll is serious enough, yet a further 10 per cent increase is also pending.

Also, according to the paper of Geo. T. Green, general manager Fifth Avenue Coach Company, New York, on "Motor Bus Transportation in New York" (see ELECTRIC RAILWAY JOURNAL, July 24, 1920), the yearly gasoline bill is now \$500,000, so a 20 per cent advance in that item would be equivalent to \$100,000. In the fiscal year ended June 30, 1919, fuel cost \$302,193, or 3.74 cents per bus-mile.

Examining the unit expenses of past years, it will be noted that the earlier crest in "conducting transportation" was in 1914, when the company had but an average of 111 buses in daily service, compared with 233 in 1919. Since the fiscal year 1915 this item has been rising steadily. The item of "maintenance of plant and equipment" reached its zenith in 1913 with the figure of 12.83 cents a mile, and by 1919 had been cut almost in half through improvements in the buses, smaller overhead charges per bus-mile operated, etc., as indicated by corresponding decreases under the sub-item "maintenance of equipment." It will be noted that the latter rose 0.51 per mile from 1918 to 1919, and there is no reason to

TABLE XVIII—CHICAGO MOTOR BUS COMPANY—STATEMENT OF OPERATION FOR YEAR ENDED JUNE 30, 1919

Gross Earnings	Twelve Months to Date	Cents per Bus-Mile
Transportation revenue.....	\$499,469	36.53
Special bus revenue.....	463	0.03
Advance revenue.....	4,175	0.31
Total operating revenue.....	\$504,107	36.87
Non-operating revenue.....	1,365	0.10
Total revenue.....	\$505,472	36.97
Operating Expenses		
Maintenance of way and structures.....	\$409	0.03
Maintenance of equipment.....	141,580	10.35
Depreciation reserve.....	44,270	3.24
Gasoline expense.....	56,290	4.12
Conducting transportation.....	168,470	12.32
Traffic expenses.....	2,558	0.19
General and miscellaneous expenses.....	61,604	4.50
Taxes.....	19,239	1.41
Total operating expenses.....	\$494,423	36.16
Net earnings.....	11,049	0.81
Fixed Charges:		
Interest on funded debt.....	11,791	0.86
Interest on unfunded debt.....	1,182	0.09
Discount on funded debt.....	7,961	0.58
Total fixed charges.....	\$20,935	1.53
Net income deficit.....	9,886	0.72
Revenue bus-miles.....	1,367,413	.....

anticipate a reduction in 1920. "Tires" show a great reduction since 1913, but they have also advanced in recent times. "Depreciation," was placed at 1.02 cents per bus-mile in 1919, but under date of Dec. 17, 1919, the Fifth Avenue Coach Company advised the New York Public Service Commission of the First District that the depreciation allowance from 1915 to 1919 fiscal years plus July 1-Oct. 31, 1919, should have been 1.98 cents per bus-mile instead of actual credit of 1.19 cents—a difference of \$271,830. The company estimated that 1.90 cents would be a proper figure as per experience of the period Jan. 1-Oct. 31, 1919. Maintenance during the same period was 7.25 cents. This compares with 6.4 cents in 1919 fiscal year.

Finally, it will be observed that the item of "taxes" (indicating taxation of other income) has advanced to 6.02 cents per bus-mile, or 13 per cent of the gross earnings per bus-mile. Truly, nothing is as certain as death and rising taxes.

TABLE XIX—MONTHLY STATEMENT OF REVENUE MILES, CHICAGO MOTOR BUS COMPANY,

For the Year Ended June 30, 1919		
1918	Revenue Miles	Total Revenue
July	159,111	\$61,629
August	129,877	56,771
September	107,867	37,931
October	95,244	32,578
November	93,738	28,227
December	97,373	27,742
1919		
January	96,609	29,667
February	95,580	26,859
March	109,431	35,670
April	111,771	41,227
May	129,603	52,519
June	141,209	69,107
Total	1,367,413	\$499,932

TABLE XXI—COMPARATIVE CUMULATIVE STATEMENT, CHICAGO MOTOR BUS COMPANY,

For Three Months Ended March				
	1920	1919		
	First Three Months	Cents per Bus-Mile	First Three Months	Cents per Bus-Mile
Total operating revenue	\$106,702	35.04	\$92,197	30.57
Non-operating revenue	324	.11	426	.14
Total revenue	\$107,027	35.15	\$92,624	30.71
Operating Expenses				
Maintenance of way and structures	121	0.04	60	0.02
Maintenance of equipment	31,832	10.46	30,795	10.21
Depreciation reserve	9,909	3.25	9,885	3.28
Gas expense	13,666	4.49	12,464	4.13
Conducting transportation	44,682	14.68	35,361	11.72
Traffic expense	2		366	
General and miscellaneous	15,752	5.17	14,981	4.97
Taxes	5,760	1.89	3,885	1.29
Total operating expenses	\$121,727	39.98	\$107,799	35.62

TABLE XX—STATEMENT OF OPERATIONS, CHICAGO MOTOR BUS COMPANY, FOR THREE MONTHS ENDED MARCH, 1920

	Jan., 1920	Cents per Bus-Mile	Feb., 1920	Cents per Bus-Mile	Mar., 1920	Cents per Bus-Mile	Total	Cents per Bus-Mile
Gross Earnings								
Transportation revenue	\$30,268	30.65	\$31,695	32.92	\$43,209	39.48	\$105,173	34.50
Special bus revenue	60	.06	30	0.03			90	0.03
Advertising revenue	330	0.34	661	0.69	447	0.41	1,439	0.47
Total operating revenue	\$30,658	31.05	\$32,386	33.64	\$43,656	39.89	\$106,702	35.04
Non-operating revenue	97	0.10	93	0.10	133	0.12	324	0.11
Total revenue	\$30,756	31.15	\$32,480	33.74	\$43,790	40.01	\$107,027	35.15
Operating Expense								
Maintenance of way and structures	83	0.08	7	0.01	30	0.03	121	0.04
Maintenance of equipment	11,957	12.11	9,834	10.22	10,040	9.17	31,832	10.46
Depreciation reserve	3,226	3.27	3,135	3.26	3,547	3.24	9,909	3.25
Gasoline expenses	4,303	4.36	4,222	4.39	5,140	4.70	13,666	4.49
Conducting transportation	15,213	15.40	13,861	14.40	15,608	14.26	44,682	14.68
Traffic expenditure					2		2	
General and miscellaneous expense	4,761	4.82	4,574	4.75	6,416	5.86	15,752	5.17
Taxes	1,734	1.76	1,833	1.90	2,192	2.01	5,760	1.89
Total operating expense	\$41,281	41.80	\$37,468	38.93	\$42,977	39.27	\$121,727	39.98
Net earnings	\$10,524	10.65	\$4,988	5.18	\$10,813	10.74	\$14,700	4.83
Fixed Charges								
Interest on funded debt	265	0.27	265	0.27	265	.24	795	0.26
Interest on unfunded debt	665	0.67	998	1.04	386	0.35	2,050	0.67
Discount on funded debt					4,889	4.47	4,889	1.61
Total fixed charges	930	0.94	1,263	1.31	5,541	5.06	7,734	2.54
Net income	11,454				4,728	4.32	22,435	7.37
Revenue bus mileage	98,750		96,273		109,439		304,462	

FAILURES AT CHICAGO AND ST. LOUIS

While the Fifth Avenue Coach Company had a margin of 11.23 cents between total operating revenue and expenses (taxes included) per bus-mile, the Chicago Motor Bus Company for the same fiscal year ended June 30, 1919, had only a margin of 0.81 cents to meet 1.53 cents per bus-mile in fixed charges. Hence, the recent bankruptcy.

The operating statement of the Chicago Motor Bus Company shown in Table XVIII indicates that the trouble was due to lower density of traffic than New York. The fifty-one-seaters of Chicago earned but 36.53 cents per mile from transportation alone, while the forty-four to forty-seven-seaters of New York in the same period earned 45.12 cents. There was less difference in operating expense, Chicago showing 36.12 cents against New York's 35.05 cents. However, there is reason to believe that the New York vehicles are easier to maintain and are kept in better condition. Table XIX is a mileage and revenue statement by months, showing the enormous difference in mileage given in summer and winter months, such as 159,111 miles in July and 96,609 miles in January, both thirty-one days, with the contrast in revenue—\$61,629.50 against \$29,667.90—still more striking. The New York bus traffic is far steadier.

To conclude the sad story of Chicago, Tables XX and XXI are presented showing revenues and expenses for the first three months of 1919 and 1920. The comparison in Table XXI shows that operating expenses were 39.98 cents per bus-mile in 1920 against 35.62 cents in 1919, while revenue rose from 30.71 cents to 35.15 cents. There was an operating deficit both years.

The latest victim to the 10-cent *de luxe* idea is the Missouri Motorbus Company, whose receiver obtained on July 1, 1920, a court order authorizing suspension of a service begun no longer ago than Feb. 9, 1920, with eleven sixty-seat double-deck buses.

CO-ORDINATED SERVICE DESIRABLE

In concluding this survey of the place of the motor bus the writer would summarize the position of affairs as follows:

No service duplicating railways should be operated except for traffic relief purposes.

Such service should be given by the local railway system.

Higher fares should be charged, preferably on a distance basis, wherever the bus offers superiority in speed and accommodations and also wherever it serves districts that are too sparsely settled to justify a permanent way.

Safe Car Windows

A RECENTLY invented laminated safety glass for use in car windows is being placed on the market. This consists of two sheets of ordinary glass between which is interposed a thin sheet of pyroxylin plastic. Hydraulic pressure and the application of the proper degree of heat weld the glass and the pyroxylin sheet together in a solid unit. The pyroxylin binder prevents any scattering of the fragments of glass in the event of violent breakage. It is claimed that the transparency of the glass is not appreciably reduced by the insertion of the plastic sheet.

# Lubrication and Lubricants

Late Theories of Lubrication Are Discussed and the Effects of Different Conditions on the Lubricant to Be Used Are Pointed Out\*

BY G. B. UPTON, M. M. E.

Professor of Experimental Engineering Cornell University

THE value of lubrication is first in the fact that it brings friction losses in machinery to tolerably small amounts, losses which without lubrication would be intolerably large. Secondly, by reducing abrasion of metal moving past metal almost to the vanishing point, lubrication not only makes machinery possible which otherwise would be impossible but even makes the machinery long lived and free from repair expense.

The cost of lubrication should not be considered simply as the cost of the lubricant and its application. The lubricant should be credited with the power saved by reduction of frictions, the saving of wear of machinery and avoidance of wage and production losses, while machinery unlubricated, or less well lubricated, would be standing idle for repairs.

The coefficient of friction of a bearing is by definition the ratio of friction force at the surface of the shaft (tangential to the shaft) to the load force holding the shaft against the bearing. This load force frequently has no direct or proportional relation to the power being transmitted in the shaft. An ordinary shop line shaft furnishes a good example. The forces on its bearings are due to weight of shaft and pulleys, and to belt pulls, and these forces are substantially independent of power transmitted along the shaft.

When a lubricant is used the laws of friction of solids go utterly into the discard. The coefficient of friction goes from a value of around 0.2 for solids to anywhere from 0.001 to infinity with complete fluid friction. We commonly get, in bearings, coefficients of friction from 0.005 to 0.02, under actual running conditions; values less than one-tenth those for unlubricated conditions.

The coefficient can and does exceed unity for very light loads with fluid lubrication, and when lubrication fails and bearings "seize," tearing and welding metal into metal, the coefficient of solid friction exceeds unity and approaches infinity.

In the limiting case for fluid friction in a bearing, a case never reached, but only approached, by an actual bearing, the laws of fluid friction would appear to be that total friction is independent of load, directly proportional to speed, directly proportional to "viscosity" of the lubricant, and inversely proportional to the radial clearance of the bearing from the shaft (the thickness of the oil film). With total friction finite and independent of load the coefficient of friction is inversely proportional to the load.

In an actual bearing these laws of the limiting case for fluid friction are not realized. The first reason for this is that the thickness of the oil film between bearing and shaft is not constant, independent of the load. The load tends to squeeze the oil out. When, and as an increasing load thins the oil film, the fluid friction increases, and a sufficient load will break the oil film and bring about a change to solid friction. The laws of

friction of an actual bearing, then, may be anywhere between the laws of "perfect fluid friction" on one side and plain solid friction on the other side, depending upon load, speed and properties of the lubricant.

## VISCOSITY IS ALL IMPORTANT

The most important single property of the lubricant is its "viscosity." This may be considered as a measure of the internal friction of the oil as layers or portions of the oil move with regard to each other. Water has low viscosity. Tar has a high viscosity. Viscosity is a property of a lubricant that works both for us and against us, but on the whole is necessary to the success of lubrication.

When a shaft is standing still in a bearing another property of an oil becomes important—the "surface

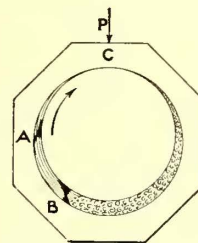


FIG. 1. OIL LAYERS TRY TO MOVE UP WITH SHAFT ROTATION

tension" or "capillary." The molecules of a substance have an attraction for one another, and also may feel attractions for molecules or other substances, if those others are near enough as molecules know distances. At the surface where a liquid touches a solid the attractions of molecules of the liquid for the rest of the liquid, in one direction away from the contact surface, are in competition with the attractions in the other direction of the liquid molecules near the contact

surface toward the mass of the solid. Usually the latter force is the stronger, and the liquid tends to climb and spread itself out on the surface of the solid, or "wets" the solid. The opposite case is possible, as witness the action of mercury; small portions of liquid mercury roll themselves up into little balls when lying on a surface of a solid, because mercury has a higher "surface tension" than almost any solid. The "wetness" of a liquid is the reciprocal function of the surface tension. Hot water is wetter than cold water, because the surface tension is less, and oils are much wetter than water, usually, for an oil film will displace a water film on a metal if it gets a chance to do so.

The wetness, or lowness of surface tension, of an oil gives it in a bearing a readiness to serve as a lubricant. If we feed oil to the crack between bearing and shaft, when the shaft is stationary, the oil will promptly crawl into the crack and fill it. The thinner the crack the harder does the oil try to get in, and the farther will it crawl. The force of this action is not big enough, unfortunately, to lift the shaft off the bearing on the loaded side. The best that the wetness of the oil can do for us is to get the clearance space of the bearing loaded with oil, so that when motion starts oil will be in place ready to begin lubrication after a fraction of the first revolution of the shaft; not more than a quarter turn is needed when circumstances are favorable.

\*Abstracted from the *Sibley Journal of Engineering* for May, 1920, where the theory and mathematical calculations are given in extended form.

Few oils are unit, single substances chemically. They are solutions in each other of considerable numbers of substances. At the surface where the oil touches a solid the composition will be a bit different from that of the bulk of the oil, or we may say that the properties of an oil surface, such as viscosity, will be different from the properties that we find for the oil as tested in bulk. The thinner the oil film in our bearings the more important will such differences be. The layer of oil affected by this type of action is only a few molecules thick. This phenomenon we will call "adsorption."

We are quite familiar with the fact that the viscosities of oils change rapidly as temperature changes. Viscosity decreases, for an approximation, about as the inverse cube of the Fahrenheit temperature in the case of the ordinary mineral lubricating oils. For pressures of thousands of pound per square inch the effect of pressure on viscosity becomes important, and the increase of viscosity is with something like the square of the

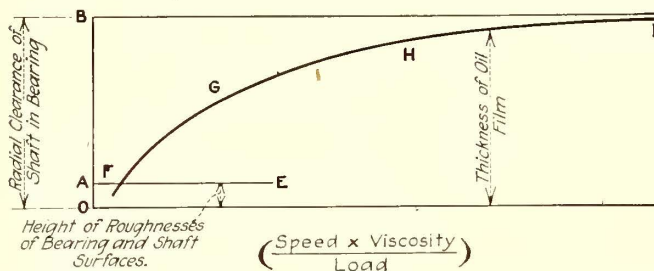


FIG. 2.—RELATION BETWEEN THICKNESS OF OIL FILM AND FORCE RATIO

pressure. This action combines with the adsorption phenomena and together the two actions probably constitute "body," or "oiliness" of the lubricant, as far as that property may be distinguished from the viscosity which is measured at ordinary pressures. The distinction between "viscosity" and "body" is at times large.

The viscosity of a lubricant is the property principally concerned in the formation and maintenance of the lubricating film under ordinary running conditions of machinery. When a shaft is stationary in a bearing the oil usually coats the surface of the shaft more or less completely save on the side toward the load on the bearing. In that direction the load has squeezed the oil out, and metallic contact exists. This metallic contact may be on only a few points, with oil pools between, if the bearing and shaft are rough surfaced. If the surfaces are good the metallic contact is a portion of cylindrical surface with length parallel to the axis of the shaft, and over a cylindrical arc of 10 to perhaps 40 or 50 deg., depending on the load, the size of the shaft and the clearance between shaft and bearing (difference of radii of outside of shaft and inside of bearing).

#### HOW IS A BEARING LUBRICATED?

When the shaft begins to turn it tries to carry oil with it. As the rotation continues and speeds up a contest begins. The shaft tries to carry oil up onto the region where the load has been holding shaft and bearing in metallic contact. The bearing tries to wipe this oil off the shaft and keep the lubricating film from forming. The force which the bearing brings to bear to keep the oil out is the load. The force by which the shaft tries to bring oil in depends on the speed of the shaft, the form, dimensions and clearance of the bearing surface and on the viscosity of the oil. To move one layer

of oil over another requires a force proportional to the product of the speed of the motion and the viscosity of the oil. Fig. 1 may show that in preventing the formation of the oil film the bearing would have to overcome this viscous force, proportional to the product of speed of shaft and viscosity of oil. It depicts the oil layers trying to move up with the motion of the shaft and being successfully held back by the bearing. Two approximate velocity traverse curves through the oil film are shown, at A and B.

At some critical value of the speed, as speed increases, the viscous force tending to form the oil film overcomes the load on the bearing, and the oil goes through, lifting the bearing on an oil film, and ending metallic contact and metallic friction. With further increase of speed above this critical speed, where solid friction ends and fluid friction begins, the oil film grows thicker. This thickening of the oil film does not, and cannot, go on indefinitely as the speed increases. The limit of film thickness is set by the radial clearance of bearing and shaft, or by concentric running of the shaft in the bearing. The higher the speed of the shaft and the viscosity of the oil the nearer will the thickness of the oil film approach the radial clearance as a limit. The thickness of the oil film, at which a bearing runs, depends on the ratio of the forces trying to form and to break the film, or it depends on the ratio of load to the product of speed and viscosity. Fig. 2 shows the form of the relation between thickness of oil film and the force ratio, using the force ratio in the reciprocal form from the preceding statement.

There is another action which in starting a shaft supplements the viscous force in getting the oil film through and ending solid friction. Incidentally, this second action may be present during starting, and absent during stopping, so that a bearing perhaps forms an oil film, in starting, at a lower value of speed times viscosity divided by load than that marking seizure in stopping. This second action is illustrated in Fig. 3, A and B. Before motion starts bearings and shaft will be in the relations to each other shown in A. When the shaft starts to rotate it will shift its contact point with the bearing, as in B, back against the direction of rotation. But this shift or attempt at it promptly pinches between shaft and bearing, at the new contact point, the oil film which was already present there. Only about 15 deg. of shaft rotation is needed to bring this action into play. (Tangent  $15^\circ = 0.27$ , which is greater than the usual coefficients of solid friction.) If, before the end of this first 15 deg. of motion, the acceleration has been high enough to get the speed above the minimum necessary to maintain the oil film, it is actually possible to get the shaft under way without experiencing any solid friction of the slipping, or abrasive, type. And in that case the starting friction will be fairly low. If the acceleration in starting is small, so that after 15 deg. of rotation the shaft velocity is still below the minimum necessary to maintain the film, then the shaft rolls for the first 15 deg. and then slips with solid friction until the speed goes high enough to carry the oil through. This latter is the usual case for plain bearings, certainly so when they start under heavy loads, and this high starting friction under load constitutes one of the disadvantages of a plain bearing when it is compared with ball or roller bearings.

When a cold machine comes up to speed the function (speed times viscosity divided by load) runs up to high values, for the viscosity is still very high. The oil film

then builds up to full thickness, as illustrated in the region *HI*, or beyond, in Fig. 2. This assumes, of course, an adequate supply of oil. Then the friction warms up the machine, as time goes on, and this lowers the viscosity of the oil. This lowering of viscosity results in a thinning of the oil film; the machine after warming up probably operates its bearings in the region *GH* of Fig. 2. If it gets into the region *FG* there is danger, with a slight further warming up, of breaking the oil film or having a bearing "seize."

A REMEDY FOR SEIZING

The remedy for seizing, since load and speed are fixed in the design and operation of the machine, is obviously the change of oil to one of higher viscosity. The low limit of tolerable viscosity for oil in a given machine is that viscosity which will give a fair factor of safety against seizing of the bearings when they are working at their worst combination of low speed and high load, and this viscosity must be had at the upper limit of bearing temperatures in the operation of the machine.

The action of a plain bearing when a machine is being shut down, and shaft speed comes down to zero, is in type very nearly the reverse of what happens in starting. The detail is different, mainly because the machine, and the oil in the bearings, are warmer than at starting. Viscosities are less, often considerably less, on account of the higher temperatures. The speeds at which the oil film breaks in shutting down are much higher than those at which the oil film forms in starting—very nearly, if not exactly, inversely as the viscosities. For in stopping as in starting there is a critical value of (speed times viscosity divided by load) below which the oil film cannot be maintained, and friction changes to mixed fluid and solid and slipping or rolling of solids. It is quite possible to determine experimentally this critical value of (speed times viscosity divided by load) which must be exceeded if lubrication is to occur in a given bearing.

There are two considerations to be kept in mind in placing oil holes and oil grooves in bearings. The first is that they do not belong in the loaded half. The second is that the oil supply should come in at the leading edge of the bearing, to be picked up by the shaft and carried up under the load with a minimum

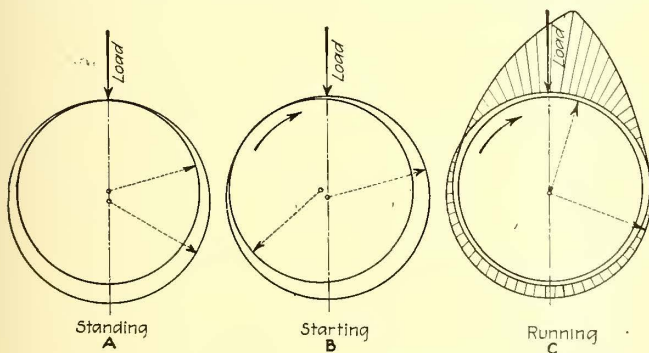


FIG. 3—EFFECTS FOR STANDING, STARTING AND RUNNING SHAFTS

of travel from the point of supply. This means practically that the best place for oil supply is about 90 deg. off the line of loading, and ahead of it. Trouble comes when the direction of loading is variable. In such a case we have to search for the point of minimum loading. One fact of importance in this connection is that a load due to centrifugal force, and hence rotating at

shaft velocity with regard to the bearing, is indifferent as to location of oil supply from the bearing, and all such forces may be properly neglected in locating the oil holes and grooves, if these are in the bearing. The centrifugal forces cannot be neglected if the oil supply comes through the shaft. Grooves in the bearing should be of the simplest—a little channel from the oil hole,

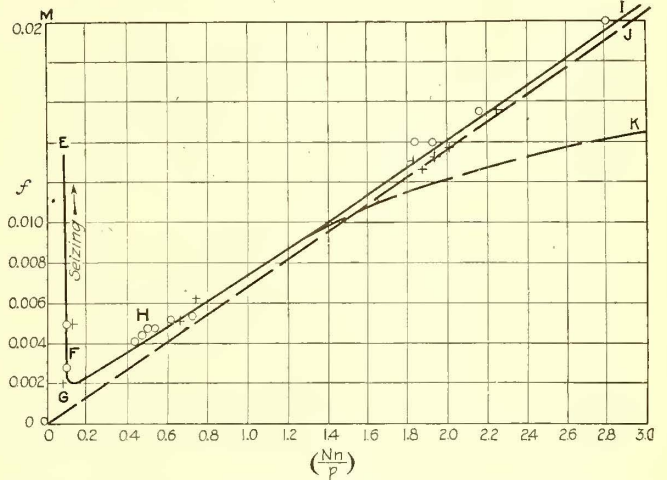


FIG. 4—CHARACTERISTIC CURVES OF RAILWAY TYPE BEARING IN THURSTON TESTING MACHINE

A characteristic curve of a railway type bearing in a Thurston testing machine is shown in Fig. 4. Shaft, steel, 3.97 in. diameter. Bearing, brass, 7.81 in. long, 3.31 in. chord of contact, 113 deg. arc of contact, bearing surface smooth, ungrooved cylinder; radial clearance about 0.003 in. Ordinate  $f$  is coefficient of friction; abscissa  $Nn/p$  is speed in r.p.m.  $\times$  viscosity in C.G.S. units, over bearing pressure on projected surface in lb. per square inch. Two different oils were used, a machine oil and an automobile oil; the different point symbols indicate these oils. Three loads were used, 39, 135, and 155 lb./in.<sup>2</sup> Three speed regions were used, 390, 230, and at seizing from 15 to 50 r.p.m. Viscosities ranged from 0.50 to 0.15 C.G.S. units. These load speeds and viscosities were combined in various ways to give a wide range of  $Nn/p$ . No matter what the combination used, a point on the curve *EFHGI* results. This shows that the experimental problem of measuring the action of oil in a bearing is fairly solved.

running out parallel to the axis of the shaft so that the length of the groove is about three-fourths of the length of the bearing. The groove should be quite a bit wider at the center of the bearing than toward the ends. The edges of the groove should be carefully and widely rounded off; they should never be sharp. A groove is made to spread oil, but it should not be forgotten that the natural end leakage of a bearing is an effective spreader of oil—perhaps even too effective, so that the groove need not do much in that line. A groove is also a reservoir of oil, to take care of starting conditions, and of intermittent character of oil supply in some systems of lubrication. Above all, grooves should never be put in the most loaded half of a bearing.

The advantage of ball or roller bearings over plain bearings are three. The starting friction of ball or roller bearings is the same as their running friction; starting friction of plain bearings is much higher than running friction, if the bearing starts under load. A plain bearing starting without load works about as easily in starting as a roller bearing. Second, the running coefficient of friction averages lower for ball and roller bearings than for plain bearings. The minimum coefficient for a plain bearing may be as low as the best of the ball bearing, but the minimum coefficient for the plain bearing comes just at the edge of seizing. Third, ball and roller bearings hold a shaft to rigid and exact concentricity. Plain bearings will do this only when operated at high speeds and light loads, and on small clearances. There is usually no necessity for concentric running of shaft and bearing; occasionally,

as in a lathe headstock, it must be assured. The disadvantage of the ball and roller bearings, as compared with plain bearings, is in initial cost and cost of installation.

Ball and roller bearings do not need lubrication to reduce their coefficient of friction, except as friction comes from rubbing of balls on each other, or on the retaining cages, or of the cages on the races. Indeed, lubrication frequently raises the coefficient instead of lowering it. The main reason for "lubrication," in ball and roller bearings, is to protect from rusting. Rust protection by the "lubricant coating the metals is quite another property from those concerned in real lubrication, though we must admit that no lubricant could be used as a lubricant anywhere if it did not have protective powers against rust.

A second case of lubrication is that of a wristpin in a steam or gas engine, or spring shackle bolt of an automobile. The line of loading is only slightly variable in direction; the loading may or may not reverse. The angular motion is small and is not continuous, but oscillating. In this case the angular motion will not carry oil in to form a lubricating film, as when the angular motion is continuous, and lubrication by oil is possible only when the loading reverses regularly. At each reversal oil runs in by combination of pressure squeezing and capillary action to the unloaded side of the pin, while being pushed out on the loaded side. The capillary action helps always to form or maintain the film. Another action of importance here is the increase of viscosity under pressure. This makes the oil squeeze out more slowly on the loaded side of the pin than it squeezes in on the unloaded side. If the pressure on a wristpin does not reverse, however, the oil will squeeze out on the loaded side and stay out. The pin may of course roll in its bushing for nearly 15 deg. of motion on either side of its central position before metallic slipping and wear need occur. Between this rolling action and the peculiar properties of grease lubrication a fair lubrication of wristpins or shackle bolts may often be had when the loads do not reverse.

#### CHIEF FUNCTION OF CUTTING LUBRICANTS IS TO CARRY OFF HEAT

What may be considered another type of lubricating action occurs in the case of our "cutting oils" or solutions applied to cutting tools in the machine shop. Kingsbury has given the explanation of this case. The action of the "lubricant" is in part merely the carrying away of heat, keeping the cutting point of the tool from becoming overheated and losing its temper. With this cooling goes real lubrication, preventing still higher frictions. A little crack forms in the work being cut, just ahead of the cutting "point" of the cutting tool. This crack fills with lubricant by the capillary action, or surface tension effect. Temperatures being high, the surface tension of the lubricant is very low, and it will fill the little crack very rapidly indeed, unless the (bulk) viscosity of the lubricant is too high. To this rapid filling of the crack high viscosity is a detriment. The chip being cut off bends outward and slides across the top of the cutting tool, tending to a metallic contact with high pressure at a point a little bit back from the cutting end of the tool. It is at this point of contact of chip and tool that lubrication is needed. The lubrication depends upon the "body" or "oiliness" of the lubricant; in other words, the viscosity should be high when the lubricating film becomes very thin and subjected

to high pressure. The previous requirement must not be forgotten that the bulk viscosity must be low, to permit the lubricant to run into place.

So far it has been tacitly assumed that the lubricant used was a liquid, possessed of a true viscosity, which viscosity was a function of temperature, pressure and film thickness. There is a large class of lubricants which are not liquids. These lubricants are called greases. Some greases are really or practically oils which have a freezing point above ordinary room temperature; put into a bearing they melt and act as oils after melting. Such melting down can be used to regulate the feeding of a grease into a bearing, though perhaps at the cost of a continuously high friction in the bearing. Greases, like the mineral oils, do not freeze completely from liquid to solid at one single temperature; they change from all liquid to a mix of liquid and solid, getting stiffer as it cools, through a wide range of temperature. In this condition of mixed solid and liquid, or colloid and liquid in soap greases, the grease is not properly called a viscous substance. It is strictly a plastic body, instead of a viscous one. The difference is this, that with a viscous body the application of any shearing force, however small, will cause a shearing motion proportional in velocity to the force, while with a plastic body the shearing force must exceed a certain finite value before any shearing motion occurs. This limiting stress to start shearing motion we may call the yield stress. When the shear stressing exceeds the yield stress, the velocity of shearing motion is proportional in a plastic body to the excess of the stress over the yield stress. Grease lubrication works at low speeds and high loads, where no oil will lubricate, and in trying to prove or disprove the theory we will make our first real measurement of those physical properties of grease which are active in lubrication.

Another consequence of the difference of viscous and plastic action occurs after motion has ceased. If load stays on after motion stops, or if metal surfaces are brought together in a direction normal to the surfaces, an oil will squeeze out from between the metals. It goes out rapidly at first, more slowly toward the end; but will in time squeeze out entirely. The squeezing out is slowed up, near its end, by the increase of viscosity under high pressures and in thin films, or "body" of the oil as distinguished from bulk viscosity. If now a grease be used instead of an oil we get the added effect of dependence of effective viscosity on rate of shear. This makes it much harder to squeeze the lubricant out from between the metals; it goes more slowly than an oil. And in the end it is probable that the greasy lubricant cannot be squeezed entirely out by a normal pressure. This may be the explanation of the superiority of greases over oils as lubricants in such places as steering spindles and spring shackle bolts of automobiles, or in plain collar thrust bearings. That property we call "greasiness," vaguely and without definition, may be the "yield stress" and "plasticity" of the grease, and the consequent dependence of effective viscosity on rate of shear.

#### CONCLUSION

We may now summarize the physical properties of lubricants in which we are interested. First is viscosity, necessary to the formation and maintenance of the lubricating film. We need the viscosity to get down to, but not go below, a certain minimum value at the highest temperature at which the lubricant must function. A

lower viscosity than this minimum will allow seizing of bearings while running; a higher viscosity is safe and tolerable, but brings higher friction in the bearings. If the lubricant must operate over a wide range of speeds, loads and temperature a high value of "body" will be desirable and helpful; that is, viscosity will increase distinctly under high pressures and in thin films. Viscosity and body need to be known as functions of temperature, so that we can foretell the action of the lubricant through the range of its temperature in service. With a grease the effective viscosity, or yield stress and plasticity, needs similarly to be known over the range of temperature, pressure and film thickness.

The measurement of surface tension of the lubricant, relative to the metals of shaft and bearings, is not usually important and probably would be difficult.

Where gravity flow, or flow through pipes under a small driving head, is used to supply lubricant to a bearing, we must be careful that at low temperatures the true or effective bulk viscosity of the lubricant does not get so high as to diminish or stop the supply. Hence an interest in the "chill point," or "cold test" of an oil (or "freezing point" of a grease?). The "chill point" test should not be done as it is now done; it should be a part of the test of viscosity as a function of temperature. The "chill point" should be taken as that temperature at which the bulk viscosity passes through a certain arbitrarily set standard viscosity; values of 10 or 20 c.g.s. absolute units are suggested.

We cannot tolerate in a lubricant any tendency to start rusting or corrosion of metals. The lubricant must be chemically neutral; not an electrolyte or becoming one to any appreciable degree. We ought to be able to use a film of a lubricant as a protection against rust.

The ideal lubricant should be permanent in its properties under the conditions of use. It should not change by oxidation, whether cold or hot, within the temperature range of service. It should not react with water either. A slight amount of evaporation of lubricant in service might be quite tolerable, if the remaining lubricant were still unchanged in properties, or not changed for the worse. Evaporation losses, as a source of oil consumption, are usually less than mechanical leakages from bearings or oiling systems. It is toward this question of permanence of properties in service that our tests of flash and burning point, carbon residues, oxidation products, etc., are directed. It may be suggested here that while the flash points and burn points of gasolines and kerosenes represent the formation of combustible mixes of the vapor of the oil with air, the case is different with lubricating oils. Usually with lubricating oils the vapor of the oil does not make a combustible mix with air at atmospheric pressure; the combustible mix found at the flash point and above is due to decomposition products of oxidation and heating of the oil. And the temperature at which this first occurs (the flash point) is usually less important in itself than the nature and rate of the decomposition indicated and the effect of it on the residual oil. We need a new set of tests for our oils, for the effects on properties of the oil of oxidation, heat, and contact with water in reality, the tests for permanence of properties under conditions of service. These tests should cover emulsification also.

The picking up in suspension in the lubricant of dirt and metal dust cannot be blamed on the lubricant, and such stuff can be settled or filtered out in a properly designed lubricating system.

## Progress Toward a National Public Works Department

THE movement to have Congress establish a national department of public works, to assume jurisdiction over all government engineering and construction undertakings, is progressing slowly but surely, according to a recent bulletin of the National Public Works Department Association, issued by M. O. Leighton, chairman. The first phase of the campaign, which is the establishment of the underlying principle, has been decisively won. The second phase, which consists of securing the right kind of a department, is to be more laborious than the first and involves much consideration of detail, sifting of evidence and presentation of results in convincing form.

The most distinct setback was the failure of the referendum of the Chamber of Commerce of the United States. The association attributes this failure to a lack of adequate publicity and to the inaction of local engineering bodies which were depended upon to take care of the issue in their own local commercial organizations. Lack of finance prevented the necessary publicity and evidence is being accumulated that important commercial bodies which voted adversely on the referendum did so in ignorance of its character, intent and purpose.

The association argues that the principles underlying the public works movement—economy and efficiency in business and conduct of the government affairs—are not confined to the public works function. It has been remarked that if a public works department is created, this will be the first step in applying businesslike principles to the entire government structure.

Delay is sometimes urged pending the announcement of a general bill for the reorganization of the government, but this seems rather useless, the logical step being to establish the public works department first.

The association points out that engineers, architects and technical men throughout the country have a rare opportunity to further the movement now because Congress is in recess and representatives are at home. It is up to the men "back home" who will ultimately benefit by the establishment of such a department to instruct their representatives in Congress and enlist their cooperation in the furtherance of this legislation.

## Appeal for Equitable Laws

THE Hon. Joseph M. Brown, who has served two terms as Governor of Georgia, has written an interesting pamphlet entitled "An Appeal for Just Laws and for Their Impartial Enforcement." Ex-Governor Brown has sent this pamphlet to all the national legislators and hopes to get action on his recommendations.

The pamphlet is of interest to the railway industry as it purports to be a history of the street railway strikes and the action of the Amalgamated Association of Street and Electric Railway Employees of America in connection therewith. The pamphlet gives data in regard to seventy-nine strikes in sixty-five cities due to the Amalgamated Association, with information on the damages and injuries incidental to these strikes. In order to eliminate such damages and injuries Ex-Governor Brown urges a law that will force unions to incorporate and thus render them liable to civil action, just as the railways are liable to civil action in damage suits.

## Record of Large Turbo-Generator Armature Breakdowns\*

Temperatures Up to 150 Deg. Not Injurious—  
Local Heating Only Cause of Breakdown—  
High Voltage Generators a Success

By F. D. NEWBURY

Manager Power Engineering Department  
Westinghouse Electric & Manufacturing Company

THE first Westinghouse generators larger than 10,000 kva. were placed in operation in 1913. These were generators roughly 20,000 kva. in size, two pole in the case of 25 cycles and four pole in the case of 60 cycles. The design of such large two and four-pole units in 1911 and 1912 was highly experimental, and while these units met the standard temperature rise guarantee of 50 deg. C. by thermometer it has since been found that the true copper temperatures of the strands nearest the air gap near the center of the core have had at least 200 deg. C. rise in some cases. Experience has shown designers how to avoid these high local temperatures to a considerable degree (mainly by reduction of eddy current losses), and this is mentioned here only to bring out the significance of the record of trouble due to heating.

During these seven years' experience there have been twenty-two cases of major armature trouble, involving twelve different installations or designs and sixteen individual units. By major armature trouble is meant trouble serious enough to result in the failure of one or more armature coils.

The classification of armature failures as to cause is in some cases a difficult matter. The events leading up to the trouble may be unknown and the evidence is very often burnt up. It has been thought best, therefore, to separate these cases into three classes, as follows:

1. Where the manufacturer has accepted responsibility.
2. Where the operating company has accepted responsibility.
3. Where the cause is unknown or in dispute.

1. Eight cases were chargeable to design, workmanship or other causes for which the manufacturer accepted responsibility. Five cases (of these eight) were caused by defects in manufacture that developed very shortly after installation. Three cases (of these eight) concerned details of design that led to failure after four or five years' operation. Two of these cases (in one design) involved high local temperatures caused by eddy currents in the top strands of the coil.

2. Eleven cases were chargeable to operating hazards for which the operating company accepted the responsibility. Four cases (of these eleven) were caused by trouble first originating outside of the armature winding. In three of these cases the fire started in the cable just outside of the generator; in the fourth case the fire started in a series transformer accidentally open circuited. Four cases (of these eleven) occurred in one installation and were caused by abnormal voltage surges that caused the outside surfaces of the insulation to catch fire. In addition to these four cases that resulted in coil failures as many more fires started that were put out before such damage was done. This trouble disappeared after the generator neutral was grounded. One case (of these eleven) was caused by ice or water (it occurred on Feb. 28) carried into the generator from the air washer. Two cases (of these eleven) were caused by forced operation under conditions that were known to be unsafe. One case involved unsafe overloads and the other case involved con-

tinued operation after it was known that the armature needed minor repairs.

3. Three cases involved unknown causes or the cause was in dispute. In two of these cases the operating company believed armature coil heating to be responsible.

This classification of armature breakdowns shows that out of nineteen cases where causes were agreed to eleven cases were caused by operating hazards for which the generator can in no way be held accountable. The majority of these cases were caused by fires of external origin.

If all the cases in which armature heating was involved, even by suspicion, are grouped there are only five cases out of twenty-two breakdowns. Two cases, involving one of the first designs, were caused by design proportions; in two others temperature was not the primary cause of breakdown, but the operating companies believed it to be a contributory cause, and in the fifth case enforced overloading was the primary cause.

The writer's opinion, based on a careful study of operating experience and based on a detailed knowledge of internal temperatures and coil and insulation design, is that breakdowns caused by armature heating are in reality due to abnormal local temperatures that have values of the order of several hundred degrees, and that temperatures of 100 deg. or 150 deg., ordinarily discussed in connection with guarantees, have very little to do with the problem. This statement, of course, applies only to windings completely insulated with mica within the slots.

### HIGH-VOLTAGE GENERATORS SUCCESSFUL

This record of breakdowns brings to the surface another fact that is interesting and important and that is reassuring to the companies operating high-voltage units. If these generators be classified according to voltage it is found there are twice as many generators wound for 11,000 volts, or higher voltage, as there are generators wound for lower voltages. But these twenty-two cases of armature breakdown are equally divided between these two voltage classes. This means that the percentage of armature breakdowns in the high-voltage generators under discussion is only one-half that of the lower voltage generators. This record would be very different with treated cloth insulation (in large high-voltage generators) that is subject to cumulative heating on account of dielectric losses increasing with temperature, or with partially closed armature slots, still used by some European designers.

This record does not prove that high-voltage generators are necessarily safer or less subject to breakdown, except in so far as breakdowns may be caused by voltage surges that are independent of generator voltage. Obviously a 10,000-volt surge would be dangerous in a 2,400-volt generator, but would be harmless in a 13,000-volt winding. The record does prove that 11,000 and 13,000-volt windings, are just as reliable as low-voltage windings, and, further, that breakdowns are generally caused by trouble unrelated to line voltage.

The facts brought out by this record may be summarized as follows:

1. The majority of armature breakdowns is caused by operating hazard originating outside the generator.
2. Armature heating in armatures completely insulated with mica is a minor cause of breakdown.
3. High-voltage generators, with mica insulation and open armature slots, are as reliable as, and probably are more reliable than, large low-voltage generators.

\*NOTE BY AUTHOR.—This article is based on a discussion of a paper, "Classification of Large Steam Turbo-Generator Failures," by Philip Torchio, presented at the A.I.E.E. convention, White Sulphur Springs, June 30, 1920.



# Going After Business at the Depot\*

Several Definite Suggestions Are Made as to How Street Railway Companies Can Get a Larger Part of the Traffic Originating at the Railroad Station—Experience of a Traveling Man Points Way to Greater Use of Signs, a Barker and a Waiting Car

By W. McK. WHITE

Western Manager Columbia Machine Works & Malleable Iron Company

EVERY day taxicabs and buses haul loads of people to and from the railroad stations at high rates of fare, when the majority of travelers would much prefer to use the street cars if the service were available and, which is just as important, if it were persistently brought to their notice. How can this business be drawn to the street railway company? The simple expedient of increasing the number of cars on the station routes or of rerouting to have a station-to-hotel circuit or an all-depot belt line is valuable and essential, but there are other steps necessary to assure a paying traffic for these cars. Or perhaps it would be well to say that other means should be used to give you the cream of this business, namely, fully loaded cars and a pleased patronage rather than a casual traffic picked up at random.

In dealing with the incoming passenger business at the depot there are three phases of the situation to consider.

First, there are those people who are familiar with the town they are entering. They know whether they can reach their destinations conveniently by trolley and what car to take. They know what the prevailing rate of fare was when they left town and they know how long they will be enroute. This traffic is fostered by the customary methods and frequency of service, and if these passengers prefer to pay a high taxi fare it is at their own volition, unless the car service for them is actually inconvenient. But the majority will use street cars if an adequate schedule is offered.

Second, there are those people who are strangers and prefer to take a cab or bus, rather than to be recognized as strangers by having to ask a policeman or station porter or some one else for directions. It may seem peculiar to have this distinction made, but I am sure you will agree that the average traveling man does not like to stand around asking how to reach his hotel. So he jumps into a cab and pays seven to ten times more than street car fare to reach his destination, and the few minutes that he saves thereby are ordinarily not worth it.

Third, there are many travelers who take cabs from force of habit, a habit acquired perhaps when they were strangers and never learned that a convenient street car service was being maintained. Of course many persons take individual means of transportation because they can well afford it and it is their desire. And many, it is to be regretted, do so because of previous experience with long waits forced by non-appearance of trolley cars. I am thinking, however, of thousands of travelers of moderate means and reasonable minds who would prefer to pay 5, 6 or 7 cents for a trolley trip to their hotels or homes, instead of a flat 50 cents or a taxi rate of 50 cents at least and usually more.

Nearly every street car system operates lines reaching the railroad stations and hotels, and in fact every possible source of revenue passengers. Quite often it costs more to gather up a few fares than the amount taken in. But if, in so doing, the habit of street car usage is fostered and the dependence on cabs is reduced the effort is worth while. The problem then is not to originate revenue traffic but to corral that which is available and which to the railways at present is lost. I am offering some suggestions which would cost little to put into effect and are entirely feasible.

A railroad station crowd usually needs only to be politely directed. But when the people emerge from a station they are greeted by cries of "Taxi, taxi!" "Cab, cab!" "Buses to hotels," and similar invitations. Now why not surprise them by letting them hear "Street car to all hotels," "Street car down town," "Street car to all points. This way, please."

Or at least why not post a prominent sign which might read "Street car leaves this station every four minutes for hotels and all parts of the city. Fare, 6 cents." Or, perhaps this: "Street cars leave this point every six minutes. Frequent, safe service to business and residence parts of the city. Fare, 7 cents."

I think that electric railways do not make sufficient use of signs to direct passengers. We know of signs which have been of great value, such as those which the Chicago Elevated Railways have painted on their structures. Tens of thousands of persons every day follow the painted arrows in the New York subway stations. The skip-stop and the later plan of loading berths have led to the use of "Car-stop" signs, but we need more signs of an informative nature and the wider use of them should be considered by all railway managers. A splendid start could be made at the steam railway stations and then on trolley poles opposite the hotel entrances. Don't you think it would please a great many travelers to see a sign across from their hotels reading "Street car to Union Depot, every five minutes. Fare 7 cents."

A sign tells its story all day long and may easily be illuminated for night display.

## STUDY THE LOAD AT THE STATION

In almost every city there are certain hours when a large number of people arrive at the stations on important trains. I believe the street car companies would do well to have a man "on the spot." Every company employs a number of uniformed street men, inspectors, supervisors and others who could be used. There should be no logical objection to the active solicitation of business which daily escapes because of passive methods. A special gathering in some locality at infrequent periods will receive the particular attention of the transportation department and yet daily hundreds of

\*Abstract of paper presented at the Illinois Electric Railway Association, midsummer meeting, Springfield, Ill., July 30.

possible fares pass through the railroad station gates unnoticed. The street car companies can invite this patronage as surely as and more properly than the taxicab drivers.

It may not be necessary to assign a representative to this work exclusively at any one station unless the business warrants it. But that inspector in his daily wanderings might just as well as not be at the Union Station when the morning trains come in, or at the Central Station when the afternoon Limited arrives. And he would become a business-getter for the company.

Coincident with this it would be wise for the traffic departments to make a closer study of the time of train arrivals and of average loads. Most street railway companies endeavor to provide a good station service, but suppose you are running a ten or twelve minute headway in the middle of the day and your car leaves the station at 11.10 a.m. when a train is due at 11.13. Or perhaps the 3.36 p.m. car meets a train on which records show a heavy passenger traffic arriving. Here is a chance for a beneficial change in the street car schedule, because trains often arrive on time, and the non-appearance of a car for even five minutes will greatly increase taxicab patronage. I feel sure that the cases mentioned are entirely possible and are occurring in many places.

The safety car has given us the slogan "A car always in sight," and this thought is justly popular in street car offices today. Now why not apply this effectively to the depot car line? A sign is good, a uniformed announcer is better, but best of all would be a waiting car. All the cries of taxicab drivers would avail little against the presence of a street car and it would draw the crowd as positively as a magnet acts on iron filings.

I think the constant presence of a street car is entirely feasible. If the line passing the station is a busy one, with a headway of a minute or two, or even less, there would always be a car in sight, down the street perhaps. Why not hold each car until the next one arrives, using this as a point for checking car movements and schedules and at the same time secure the advantage of always having a car at the station. And if the station is on a single line with a longer headway, why not have your lay-over there instead of at some unimportant place at the far end of town. A station lay-over point would offer conveniences for your crews, and I would again suggest that each car await the arrival of the next following one before departing.

Recently I was discussing this subject in New Orleans with Nelson H. Brown, general superintendent of railroads, and he told me of an experience he had in Worcester, Mass., several years ago. He put on a depot car, the only duty of which was to meet incoming trains and its crew had no specific route. The conductor would ask passengers where they wished to go and he would route the car to suit the convenience of the greatest number. This car proved to be the best paying one in Worcester. Many other schemes can be evolved to attract the station trade and to facilitate handling it. If the traffic is heavy enough a hotel-station line may be installed as in Cleveland and Kansas City.

It is not often that you find a situation like that in Peoria, where the street car company has a terminus within the steam railroad station, but this might be arranged elsewhere. The collection of fares by a street man as well as by the conductor, the increase of car service and other suggestions are in order. And I hope that your carpenter shops will be instructed to turn out some good signs, your painter to letter them (black on

a cream background is a good combination) and your line department to mount them on poles at stations and hotels.

#### POLITE CREWS HELP

In conclusion, I am going to offer a suggestion concerning the platform men on the depot cars. These cars should be manned by crews who can politely and intelligently handle strangers, who know the city, are willing to answer questions and to call the names of streets and hotels. They should be coached on the value of this business and urged to co-operate. They should be instructed not to pull away just when a train arrives, for nothing is more aggravating to those coming through a station than to see a car just departing when so many more passengers could be carried. The trouble is that the average crew considers the schedule more important than public service and the filling of the fare box. Where a delay of two or even three minutes would fill a car with pleased passengers it is worth while to wait.

We have all heard exclamations like these: "Gee, we were lucky to catch a car right away," "Thanks for waiting," "This is fine." Isn't that far better in the psychology of public relations than "Oh, pshaw! Why didn't they wait," or "Just my luck to miss that car." Or, what is far worse, "Well, I guess we'd better take a taxi."

#### "Facts About Figures"

**A**N EXPERT on publicity whose name is known from coast to coast writes as follows on the editorial on "Facts About Figures—Figures About Facts," in the issue of this paper for June 26:

You have hit the keynote about "facts and figures" exactly. Figures are the most tiresome and uninteresting, as well as unconvincing, things in the world except to the "bug" who dotes on that sort of stuff, but for the average normal mind we have got to prepare the figures according to a different formula, and your formula is the right one.

Many a time I have thanked the Lord for the broad vision of the executive officers of the company with which I am connected for accepting this view of the situation and that is why I never attempt in my work to run a mass of unvarnished statistics. The lay mind will not react on figures or technical statistical matter. You have got to speak in the language of the street or the street car when you try to present statistical matter.

Think of the world of time, energy and gray matter utterly wasted by our high-priced efficiency experts, traffic sharks, accountants, engineers and others in preparing a maze of figures that prove nothing to the untutored, non-technical mind.

Now, I want to congratulate you for the concise and clear way you have stated the proposition. It is "facts about figures" and not "figures about facts" that drive your argument home, and the fewer figures the better.

I hope every publicity man and every executive and every figure expert in our industry read that editorial and took it to himself as a personal message.

#### New Side Bearing Trolley Wheel

**T**HE Thornton Trolley Wheel Company, Ashland, Ky., is placing on the market a new type of construction for trolley wheels. No bushing or central axle is used, but instead two spherical side bearings with removable bearing bosses. The bearing bracket is provided with two grease reservoirs, so that the wearing parts are lubricated with grease. It is claimed that the two reservoirs will provide sufficient lubrication when filled to operate approximately 1,000 miles under normal service conditions.

# St. Paul Electrification Results\*

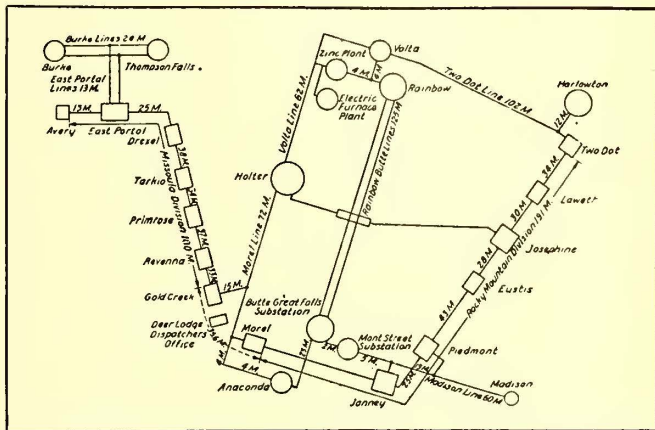
## Complete Results of Electrical Operation for the Year 1919—Effect of the New Power Indicator and Limiting System—Itemization of Costs

By R. BEEUWKES

Engineer Chicago, Milwaukee & St. Paul Railway

**P**OWER for the electrical operation of the Chicago, Milwaukee & St. Paul Railway between Harlowton, Mont., and Avery, Idaho, is delivered to the transmission system in the form of 100,000-volt, three-phase, 60-cycle current. The power is supplied under two separate contracts, one for the Rocky Mountain division, extending from Harlowton to Deer Lodge, and the other for the Missoula division, extending from Deer Lodge to Avery.

The power company's 100,000-volt transmission lines are shown in the single line layout of the system, as are also the points of power delivery to the railway company and the latter's 100,000-volt transmission system.



TRANSMISSION LINE AND SUBSTATION LAYOUT FOR THE CHICAGO, MILWAUKEE & ST. PAUL ELECTRIFICATION

TABLE I—ST. PAUL ELECTRIFICATION—LIST OF SUBSTATIONS AND THEIR EQUIPMENT

Rocky Mountain Division		
Substations	Transformers	Motor Generators
Two Dot	Two 2,500 kva.	Two 2,000 kw.
Loweth	Two 2,500 kva.	Two 2,000 kw.
Josephine	Two 2,500 kva.	Two 2,000 kw.
Eustis	Two 2,500 kva.	Two 2,000 kw.
Piedmont	Three 1,900 kva.	Three 1,500 kw.
Janney	Three 1,900 kva.	Three 1,500 kw.
Morel	Two 2,500 kva.	Two 2,000 kw.
Missoula Division		
Gold Creek	Two 2,500 kva.	Two 2,000 kw.
Ravenna	Two 2,500 kva.	Two 2,000 kw.
Primrose	Two 2,500 kva.	Two 2,000 kw.
Tarkio	Two 2,500 kva.	Two 2,000 kw.
Drexel	Two 2,500 kva.	Two 2,000 kw.
Fast Portal	Three 2,500 kva.	Three 2,000 kw.
Avery	Three 1,900 kva.	Three 1,500 kw.

18½ miles from Deer Lodge, a distance of 180 miles, to the substation at Avery, the western terminus of the division.

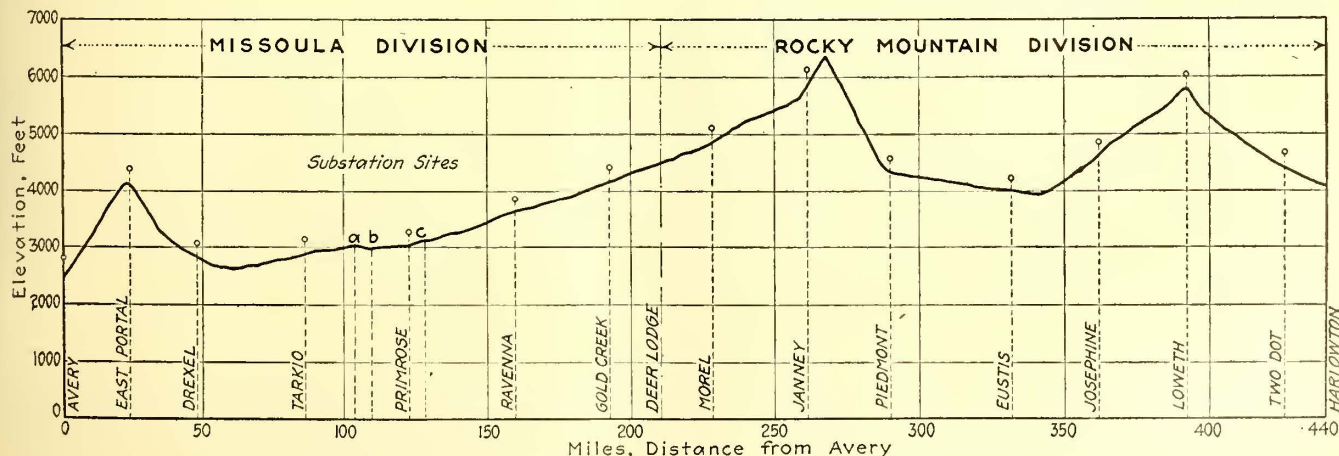
Seven substations on each division are used to convert the 100,000-volt alternating current of the transmission line to the 3,000-volt direct current used for traction purposes. Each motor generator consists of two 1,500-volt direct current generators connected in series and driven by a 2,300-volt synchronous motor supplied from the substation high tension buses through a three-phase, 100,000/23,000-volt transformer and is guaranteed for a maximum five-minute overload of 200 per cent. The rated capacities of these stations are given in Table I.

The accompanying diagram shows diagrammatically the railway company's high-tension line, arrangement of apparatus in the substations and the general layout of the 3,000-volt distribution or trolley system.

The contact wires of the trolley system consist for the main line of two No. 0000 B. & S. grooved trolley wire flexibly supported side by side from a ½-in. steel catenary and tapped at intervals of about every 1,000 ft.

The railway transmission line of the Rocky Mountain division extends from Two Dot substation to the Morel substation, a distance of 184 miles, the former point being 12 miles from Harlowton, eastern terminus of the division, and the latter point 17 miles from Deer Lodge, the western terminus. Power is delivered by the power company at the Two Dot, Josephine, Piedmont and Morel substations. The railway transmission line of the Missoula division extends from Gold Creek substation,

\*Abstract of paper presented before the Pacific Coast Section of the American Institute of Electrical Engineers, Portland, Ore., July 15, 1920.



PROFILE OF THE ELECTRIFIED DIVISIONS, SHOWING SUBSTATIONS

to a feeder which connects to the adjacent substation buses through switches and automatic circuit breakers. Over passing, industrial and similar tracks only a single No. 0000 copper trolley wire is used. There is an insulated air gap in the trolley in front of each substation separating the trolley system west of the substation from that east of the substation; that is, portions east and west of the substations are fed, respectively, through separate feeder breakers. There is also an insulated air gap at the beginning and end of every passing track, so that by means of a section switch installed in the feeder at the gap the district between any two gaps may be isolated in case of trouble so as to permit operation up to the location of the open switches.

The return circuit consists of the 90-lb. running rails and, in general, of a No. 0000 B. & S. copper supplementary negative wire which is run along the trolley poles and connected to the track at intervals averaging about 8,000 ft. through each alternate signal system reactance bond. This supplementary negative, however, is intended more as a safety measure to bridge open rail bonds than to increase the return circuit conductivity. However, on various feeder cutoffs on the mountain grades, where the conductivity of the positive circuit closely approaches that of the return circuit, one of the two feeders on the cutoff is in parallel with the running rails and is provided for the purpose of increasing the return circuit conductivity.

POWER DEMAND CONTROLLED BY TRAIN DISPATCHER

The terms of the power contracts are similar and each provides for a minimum payment on basis of a 60 per cent load factor. Where the load factor exceeds 60 per cent payment is made on basis of the actual kilowatt-hours consumed, the rate being 5.36 mills per kilowatt-hour. The demand is controlled for each division by means of a so-called power indicating and limiting system,\* which on the Rocky Mountain division was put into operation early in the year 1918 and on the Missoula division a few months ago. Briefly, this system

\*This system was described in the ELECTRIC RAILWAY JOURNAL for April 10, 1920, page 759, in the article "Holding Down Line Peaks," by J. J. Linebaugh.

is so arranged as to indicate and record at the dispatcher's office at Deer Lodge the total kilowatts or demand being supplied in any instant by the power company to the railway company and to prevent the maximum demand from exceeding a certain amount as determined by the "demand setting made by the dispatcher," this limiting action being secured by lowering of the substation direct-current voltage and therefore of the train speeds.

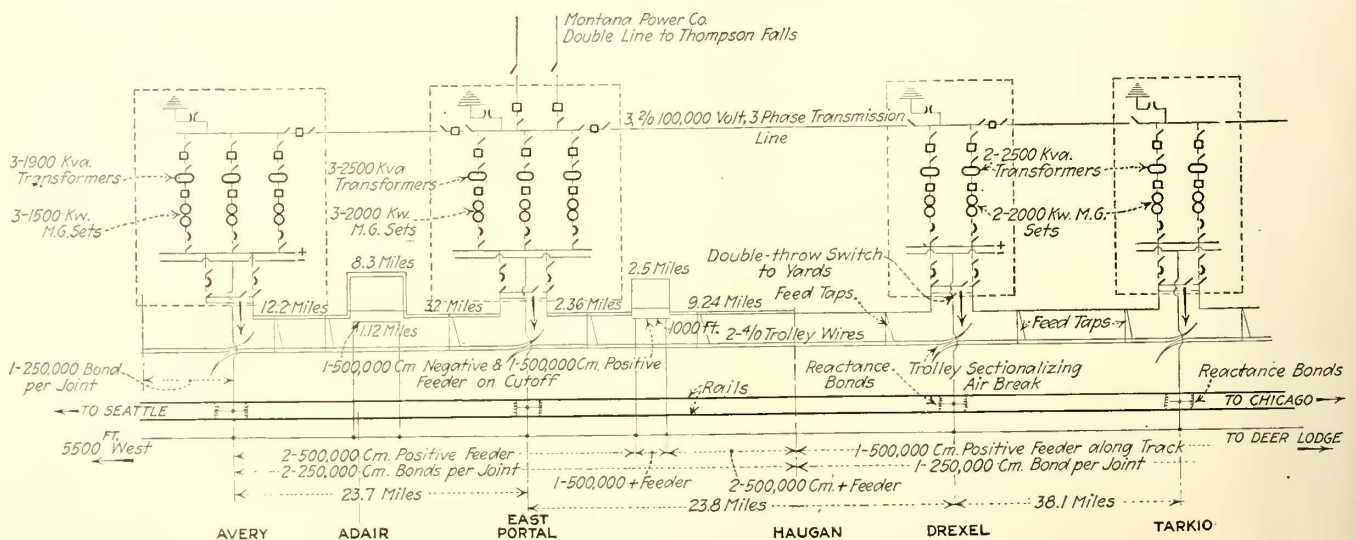
The effect of this limiting action is clearly indicated on the graphic time-table of train movements on the Rocky Mountain division for February 19, 1920, and corresponding load curve traced by tapalog meter of the power indicating and limiting system with the load limit set at 16,000 kw.

The percentage of time when the limiting action will take place, for a given amount of business, will depend on the demand setting and on the possibilities of spacing the trains so that as few as possible will at one time

TABLE II—ST. PAUL ELECTRIFICATION, LIMIT SETTING AND AVERAGE KILOWATT-HOUR TAKEN MONTHLY

Month	Limit Setting	Average Monthly Load in Kilowatts	Per Cent Time Limiting Action Takes Place
July, 1918.....	12,000	8,020	13.0
Aug., 1918.....	12,000	7,820	15.5
Sept., 1918.....	12,000	6,675	8.2
May, 1919.....	14,000	7,840	4.62
Aug., 1919.....	14,000	7,650	4.12
Sept., 1919.....	14,000	8,230	9.50
Oct., 1919.....	14,000	8,420	10.65
Nov., 1919.....	14,000	7,115	8.24
Feb., 1920.....	16,000	8,625	2.40
Mar., 1920.....	16,000	8,680	2.20
April, 1920.....	16,000	8,620	.90

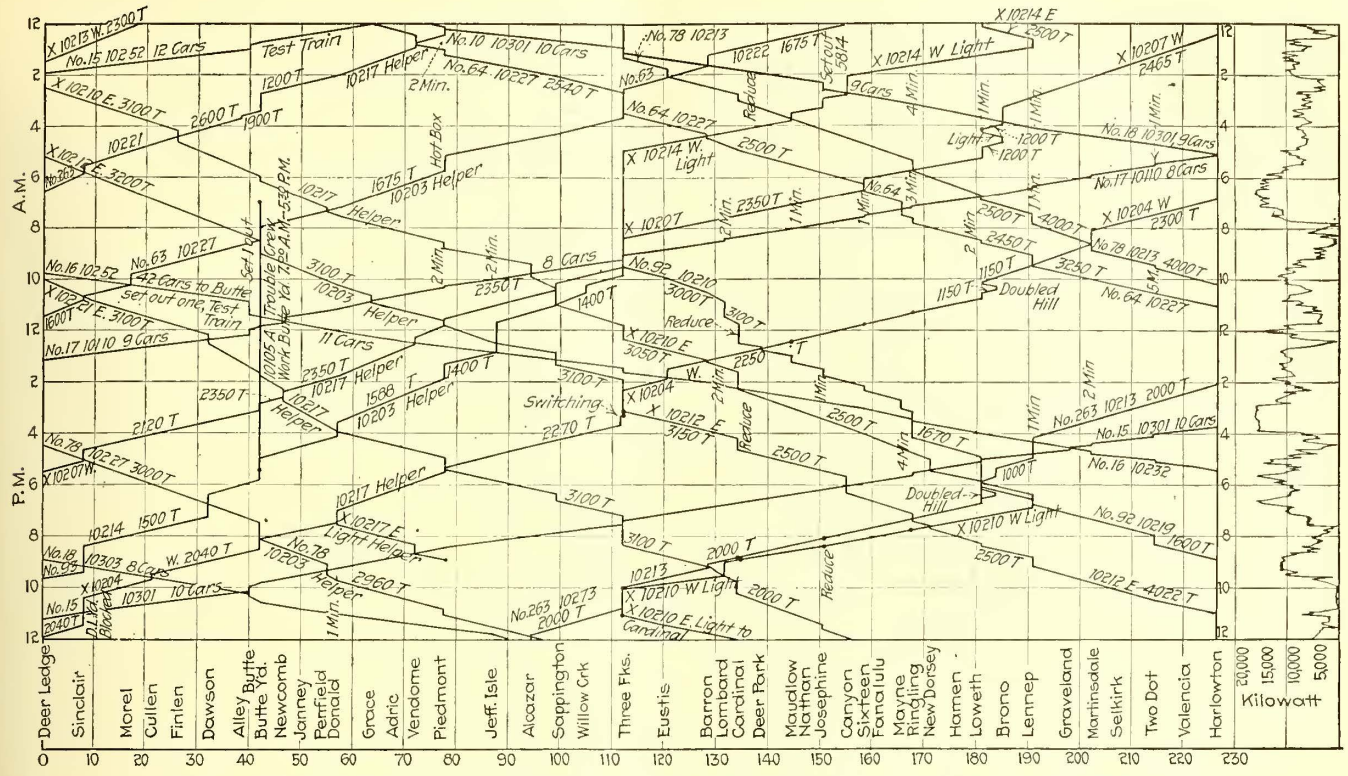
be operating on the heavier grades, the latter matter, except as regards passenger trains and certain time freights, being to a considerable extent in the hands of the train dispatchers. The slowing up of the train speeds of course results in increased train and engine-men's expense and increased time in getting freight over the road, and a proper balance must be struck between this increased expense and the saving in power cost and the limit setting determined upon accordingly. Table II gives an idea of the percentage of time the limiting action takes place with average kilowatt load and settings as indicated, this percentage being based



ELECTRICAL LAYOUT FOR A PART OF THE SYSTEM

NOTE.—Feeder and trolley are sectionalized at all substations and railway stations. No. 0000 feeder is tapped to each trolley every 1,000 feet. Reactance bonds are 5,000 to 6,000 ft. apart. Negative taps are made to the middle point of every second reactance bond. Side track rails are bonded in series with the supplementary negative. One rail bonded with one 250,000 circ.mil

bond per joint in the yard. Trolley feed taps are disconnected for a distance of 1 mile on each side of each substation where there is a single feeder and 2 miles where there is a double feeder, except at Ravenna, where the tunnel entrance east, and at East Portal, where the tunnel entrance west, limit the distance. Other portions are similar to that above.



GRAPHIC TRAIN SHEET AND LOAD CURVE FOR THE ROCKY MOUNTAIN DIVISION, FEB. 19, 1920

on the number of hours the limiting system was actually in service.

In arriving at the amounts chargeable for power against the different classes of train service, the total kilowatt-hours to be paid for—that is, the actual kilowatt-hours, or the actual kilowatt-hours increased, if necessary, to correspond to a minimum 60 per cent load factor—are taken and from them are deducted the kilowatt-hours metered against substation lighting, auxiliary power, signal system supply, etc., amounting to about 1 per cent. The remaining kilowatt-hours are then divided between the different classes of train service, freight, passenger and non-revenue, in proportion to the total net kilowatt-hour readings obtained for these respective services from wattmeters installed in the locomotives. These readings are taken on the

The ratio of the total net locomotive wattmeter readings, all services, to the total actual kilowatt-hours input to the system chargeable to locomotives for the various months of 1919 is given in Table IIIA.

As there are no wattmeters installed in the direct-

TABLE III—ST. PAUL ELECTRIFICATION—AVERAGE INPUT OF SUBSTATIONS

Rocky Mountain Division			Missoula Division		
Substation	*Total Avg. Annual Kw. Input Net to Motor Generators	**Per Motor Generator	Substation	*Total Avg. Annual Kw. Input Net to Motor Generators	**Per Motor Generator
Two Dot	895	813	Gold Creek	1,150	1,128
Loweth	962	783	Ravenna	915	1,115
Josephine	1,014	1,013	Primrose	908	925
Eustis	1,022	1,016	Tarkio	843	803
Piedmont	1,218	617	Drexel	790	778
Janney	1,390	559	East Portal	1,390	778
Morel	1,047	1,072	Avery	812	523
System total	7,548		System total	6,808	

\* Total kw.-hrs. Computed on the basis of 8,856 hours in the year; four days in December are included.  
 \*\* Total kw.-hrs.: Total running hours of motor generators.

TABLE IIIA—ST. PAUL ELECTRIFICATION—AVERAGE INPUT

Month	Rocky Mountain Division			Missoula Division		
	Actual Kw.-Hrs. System Input for Locomotives	Net Kw.-Hrs. Input at Locomotive	Ratio	Actual Kw.-Hrs. System Input for Locomotives	Net Kw.-Hrs. Input at Locomotives	Ratio
January	6,381,233	4,838,480	75.9	5,540,581	3,753,430	67.6
February	4,610,607	2,921,840	63.3	4,107,960	2,702,710	65.8
March	5,795,859	4,351,126	75.2	5,412,048	3,469,120	64.2
April	5,949,840	3,962,650	66.6	5,429,932	3,574,080	65.8
May	5,803,455	4,146,517	71.4	5,745,397	3,795,770	66.2
June	5,662,650	4,100,810	72.3	5,697,785	3,853,590	67.6
July	5,744,738	3,794,940	66.2	5,318,692	3,505,630	65.8
August	5,648,815	3,755,280	66.5	5,133,008	3,255,820	63.4
Sept.	5,892,430	3,799,830	64.5	5,102,562	3,434,010	67.3
October	6,222,486	3,971,149	63.8	5,389,883	3,654,955	67.8
November	5,095,937	3,425,458	67.2	4,879,130	3,181,456	65.2
December	5,809,976	3,830,870	65.8	4,971,601	3,382,700	67.9
Total	68,618,026	45,898,850	68.3	62,728,579	41,563,271	66.3

form provided for the purpose, and a record of the power consumption of each train is thus obtained. The readings are referred to as "net" readings, as they represent motored energy less regenerated energy.

current side of the substations, a ratio for net substation output to system input or to locomotive is not obtainable. There are, however, wattmeters in the circuits of the individual motor generator sets and Table III, considered in connection with the profile of the line, and Table IV, on page 230, will be of interest in showing the manner in which the energy is distributed among the respective substations, average kilowatt being used for convenience instead of total kilowatt-hours, and the whole of the year 1919 being taken.

OPERATING FIGURES FOR 1919

The figures in Table V, on the next page, show for the year 1919 the net kilowatt-hours per thousand gross ton-miles for freight revenue service and passenger service, respectively, and corresponding cost of these kilowatt-hours at the high tension bus or point of delivery of the power to the railway system. The lesser

TABLE IV—ST. PAUL ELECTRIFICATION, LINE DATA

— Curve in Degrees — — Grade — —

From	Elevation* Maximum	Average	Total	Distance Miles†	
				Maximum	Average
Avery to Kyle	2,495	4.62	1,706.3	1.70	1.35
Kyle to Falcon	2,996	4.01	1,051.8	1.70	1.48
Falcon to Adair	3,394	3.73	990.4	1.70	1.50
Adair to Roland	3,782	4.24	1,074.3	1.70	1.45
Roland to Tunnel No. 20	4,150	4.06	112.0	1.12	1.03
Tunnel No. 20 to East Portal	4,160	4.06	112.0	1.07	1.03
East Portal to Saltese	4,147	3.45	1,563.6	1.70	1.53
Saltese to Haugan	3,452	2.35	671.5	1.70	1.09
Haugan to Drexel	3,142	2.62	1,342.8	0.80	0.56
Drexel to Foraker	2,856	3.27	775.8	0.80	0.52
Foraker to St. Regis	2,733	10	2.25	583.0	0.60
St. Regis to Ashmore	2,678	5	0.85	280.9	0.40
Ashmore to Superior	2,674	3	0.73	230.6	0.40
Superior to Cobden	2,717	3.02	166.4	0.40	0.23
Cobden to Tarkio	2,823	5	0.94	388.7	0.40
Tarkio to Cyr	2,925	5	0.87	397.0	0.40
Cyr to Alberton	2,988	3	0.84	287.0	0.35
Alberton to A	3,042	3	1.20	165.0	0.35
A to B	3,078	3	1.29	401.8	0.40
B to Frenchtown	3,003	2.84	105.1	0.20	0.21
Frenchtown to Primrose	3,028	2	0.26	84.4	0.30
Primrose to C	3,071	0	0.00	0.0	0.46
C to Missoula	3,160	4	0.39	103.8	0.32
Missoula to Bonner Jct.	3,182	10	1.42	474.7	0.40
Bonner Jct. to Clinton	3,279	3	0.29	152.0	0.40
Clinton to Ravenna	3,452	2	0.20	121.1	0.40
Ravenna to Bearmouth	3,665	3	0.84	454.6	0.40
Bearmouth to Drummond	3,805	4	0.64	350.7	0.40
Drummond to Gold Creek	3,955	2.5	0.15	96.0	0.40
Gold Creek to Garrison	4,188	3	0.8	325.1	0.40
Garrison to Deer Lodge	4,329	3	0.3	174.0	0.40
Deer Lodge to Sinclair	4,520	3	0.06	20.6	0.60
Sinclair to Morel	4,684	3	0.17	84.8	0.60
Morel to Finlen	4,882	3	0.95	441.3	0.60
Finlen to Dawson	5,145	10	1.58	5.33	1.06
Dawson to Colorado Jct.	5,292	6	0.77	3.13	0.68
Colorado Jct. to Butte Yard	5,480	8	20.0	215.0	0.75
Butte Yard to Newcomb	5,484	5	0.44	109.1	0.90
Newcomb to Janney	5,618	8	2.9	853.8	1.66
Janney to Continental Divide	5,871	8	2.65	865.1	1.66
Continental Divide to Grace	6,352	8	2.81	1,052.2	2.00
Grace to Cedric	5,664	8	2.49	631.8	2.00
Cedric to Vendome	5,178	8	3.46	693.1	2.00
Vendome to Piedmont	4,818	1	0.06	19.0	2.00
Piedmont to Jefferson Island	4,359	1	0.11	56.9	0.30
Jefferson Island to Alcazar	4,263	8	2.18	773.2	0.26
Alcazar to Sappington	4,232	4	1.10	290.5	0.33
Sappington to Willow Creek	4,180	2	0.14	48.0	0.30
Willow Creek to Three Forks	4,145	1	0.02	8.4	0.40
Three Forks to Eustis	4,066	5	0.25	171.2	0.30
Eustis to Barron	4,017	6	1.25	508.9	0.30
Barron to Lombard	3,971	8	1.92	314.0	0.30
Lombard to Deer Park	3,987	8	1.65	637.3	1.00
Deer Park to Nathan	4,206	8	1.97	812.3	1.00
Nathan to Josephine	4,454	9.5	2.05	444.0	1.00
Josephine to Canyon	4,645	10	2.41	585.5	1.00
Canyon to Fanalulu	4,869	10	1.58	518.1	1.00
Fanalulu to Moyne	5,062	8	2.15	455.1	1.00
Moyne to New Dorsey	5,209	3	0.40	125.5	0.82
New Dorsey to Hamen	5,346	6	0.99	271.2	1.00
Hamen to Loweth	5,573	6	1.12	253.0	1.00
Loweth to Bruno	5,789	10	2.60	603.4	2.00
Bruno to Lennep	5,491	10	1.75	508.4	1.10
Lennep to Groveland	5,225	4	0.11	195.0	1.00
Groveland to Martinsdale	5,001	1	0.03	7.2	0.99
Martinsdale to Selkirk	4,812	2	0.15	44.3	1.00
Selkirk to Two Dot	4,624	2	0.12	42.2	1.04
Two Dot to Valencia	4,427	4	0.37	16.9	0.81
Valencia to Harlowton	4,290	1	0.06	18.1	0.60

\* Elevation at first place.  
† Sealed from profile.

consumption of energy during the summer months as compared with the winter months will be noted. The figures for the passenger service are approximate, as the ton-mile data is based on the assumption of an average weight per car, no record of the particular cars handled in all the separate trains being available.

TABLE VI—ST. PAUL ELECTRIFICATION—DISTRIBUTION OF OPERATING COSTS FOR 1919

Account	Total All Services	Per Unit
255. Power substation buildings	\$8,487	\$606.00 per bldg.
257. Power transmission system	1,773	4.87 per mile
259. Power distribution system	78,461	179.00 per route-mile
261. Power line poles and fixtures	24,299	55.50 per route-mile
306. Power substation apparatus	40,224	2,870.00 per station
383. Train and yard power produced	102,152	7,300.00 per station
395. Total	\$255,396	

1. Cost per thousand gross ton-miles trailing freight as actually distributed in accounts. 28.8 cents

2. Cost per thousand gross ton-miles train freight as actually distributed in accounts. 24.9 cents

3. Cost per thousand gross ton-miles trailing freight on basis distribution in proportion to freight kilowatt-hours. 30.2 cents

4. Cost per thousand gross ton-miles train freight on basis distribution in proportion to freight kilowatt-hours. 26.2 cents

5. Cost per actual kilowatt-hours, delivered to locomotives. 1.1 cents

TABLE V—ST. PAUL ELECTRIFICATION—OPERATING STATISTICS FOR 1919

Net Kw.-Hrs. per Thousand  
Gross Ton-Miles

— Trailing — — Train —

Month	Thousand Gross Ton-Miles, Trail- ing	At High Tension		At Locomotive		Load Factor	Cost of Kw.-Hrs. per M. Trailing, Gross Ton-Miles, Cents	
		Bus	Locomotive	Bus	Locomotive			
Freight Service:								
Rocky Mountain Division								
Jan.	98,478	47.8	36.3	41.2	31.3	63.7	25.7	
Feb.	79,859	43.1	27.3	37.3	23.6	57.7	24.0	
March	118,297	39.0	29.3	33.9	25.5	65.3	20.9	
April	121,646	38.5	25.6	33.1	22.0	61.1	20.7	
May	124,395	36.5	26.1	31.7	22.6	56.0	20.9	
June	122,264	36.7	26.2	31.7	22.9	56.4	20.9	
July	122,723	36.7	24.3	31.6	20.9	55.4	21.3	
Aug.	111,092	40.9	27.2	34.9	23.2	54.6	22.4	
Sept.	115,787	39.7	25.6	34.1	22.0	58.8	21.7	
Oct.	108,920	45.8	29.2	39.4	25.1	60.0	23.6	
Nov.	86,267	44.0	29.6	37.7	25.3	50.9	27.8	
Jan.-Nov. Avgs.		40.5	27.7	34.8	23.8	57.3	22.5	
Missoula Division								
Jan.	87,598	44.3	29.9	38.6	26.1	...	23.8	
Feb.	73,481	39.8	26.2	35.2	23.2	...	21.7	
March	103,613	40.3	25.8	35.6	22.8	...	21.6	
April	109,133	38.5	25.4	34.1	22.4	...	20.2	
May	118,331	37.9	25.1	33.5	22.2	...	20.3	
June	116,660	37.8	25.6	33.3	22.5	...	20.3	
July	106,045	38.1	25.0	33.5	22.0	...	20.4	
Aug.	101,017	38.8	24.6	34.3	21.8	...	20.8	
Sept.	99,578	38.5	25.9	34.1	22.9	...	20.6	
Oct.	100,504	40.1	27.1	35.3	23.9	...	21.4	
Nov.	78,459	45.3	29.5	39.2	25.5	...	24.3	
Jan.-Nov. Avgs.		39.7	26.3	35.0	23.1	...	21.3	
Rocky Mountain and Missoula Divisions Combined								
Jan.-Nov.	302,507	40.1	27.1	34.9	23.5	...	21.9	
Jan.-Dec.	476,085	...	...	...	...	...	22.3	
Passenger Service:								
Jan.-Nov.	340,480	56.8	38.7	39.7	27.1	...	38.4	
Jan.-Dec.	378,080	...	...	...	...	...	38.1	

The cost of maintaining and operating the transmission lines, substations and trolley system for the year 1919 is given in Table VI and a final figure thus arrived at showing the approximate total operating costs involved in the delivery of the electric energy to the locomotives.

### CONCLUSION

The installation being comparatively new, it might naturally be assumed without consideration of other facts that the figures for the maintenance are considerably lower than those which will eventually obtain, but it should also be borne in mind that the maintenance and operating costs given will, except for power, remain more or less constant so far as any consideration of their being affected by the business handled is concerned, so that the cost per thousand ton-miles would be correspondingly reduced as business is increased. It is also expected that considerable improvement will be effected in maintenance methods, which would again tend to reduce costs. The figures are therefore given merely to show the results which are at present being obtained.

## Schuylkill Railway Installing Telephone Dispatch System

THE Schuylkill Railway, Girardville, Pa., is installing a telephone dispatch system over its entire property. The wires are being placed on the 6,600-volt high tension poles and are properly protected with fuses ahead and behind. Telephone instruments are being located at each turnout in an iron box with the proper switch lock, to which each conductor carries a key. When completed jack boxes will be located at convenient points between the regular telephones and each car will carry a phone with an extension cord. Kellogg 2,500-ohm 5-bar ringer instruments are being used.

# Rochester Accepts New Agreement

**Service-at-Cost Contract Between City of Rochester and New York State Railways Passed by City Council on July 14—Balancing Fund and Sliding Scale of Rates Features of the Agreement—Commissioner of Railways Has Heavy Responsibilities**

**R**OCHESTER has at last agreed upon a plan for solving its railway problems. The new service-at-cost agreement will go into effect on Aug. 1 with 7 cents or ten tickets for 65 cents and free transfers as the initial fare conditions.

The agreement extends until Aug. 1, 1930, and incorporates a clause giving the city the right of renewal for another ten-year period. Pending an appraisal the value of the property is fixed at \$17,500,000, and this sum is taken as the temporary base value upon which a return is allowed.

The existing franchise of the New York Railways contains a 5-cent fare clause, and therefore the company could obtain no financial relief from the Public Service Commission and the city could not obtain better service due to the financial condition of the company. The service-at-cost agreement was the solution to the situation.

It is the purpose of the city and the company in entering this agreement so to arrange their affairs that the company shall provide the very best service which it is possible to give under any system of careful, scientific and economical management and to secure to the company a proper return upon the value of the property used in service.

## DUTIES OF CITY COMMISSIONER

Articles I and II of the agreement define terms and outline the general objects and considerations of the agreement. Article III deals with an officer called Commissioner of Railways and defines his powers and duties.

The duty of the Commissioner of Railways is fundamentally to administer the terms of the contract on behalf of the city. He is appointed by the Mayor subject to the approval of the Council and receives a salary of \$12,000 per year from the railway company.

The commissioner "shall have power and it shall be his duty to direct the making of extensions, betterments and permanent improvements; to direct the making of repairs, renewals and replacements; to direct the purchase of cars and parts thereof, and all other items of equipment, the purchase of real estate, the abandonment and replacement of equipment of every kind whatsoever. He shall have power to select and designate materials used in track construction and items of equipment, as to quality, type, kind and class. He shall direct the routing and rerouting of cars, fix and determine all places for cars to stop; fix and determine all schedules, headways, the rate of speed of cars, methods of operation, and do, order and direct generally in respect to operation. . . ."

The commissioner is limited, however, by restrictive clauses covering orders for unprofitable extensions or service, and in case of dispute his decisions are subject to review by a board of arbitration. The commissioner must work through the company organization in actually carrying out his duties, while the company, on the other hand, must furnish him office space and clerical help,

pay the salaries of his department, keep such accounts as he may designate and furnish him with duplicates of all its accounts, orders and other operating and engineering records.

The commissioner passes on all purchases and accident claims, salaries and wages and any other items affecting the cost and kind of service. The franchise prohibits any labor contract which does not contain an arbitration clause.

The commissioner has all the legal and accounting force of the city at his disposal and must make quarterly reports to the City Council and Mayor.

An interesting provision is that the commissioner shall have power, with the consent of the company, to install and carry out such supplemental transportation and methods of transportation in connection with surface cars operated hereunder as he and the company shall determine to be proper and necessary in the interests of good service.

## VALUE AND RATES OF FARE

The commissioner is protected in tenure of office against any summary dismissal. He must contract to resign in case of a permanent disability, misbehavior, or if he shall in any way become incompetent to fulfill the obligations of his office, but if he fails to do so he can be removed only through the enforcement of his contract by a suit in equity in the Supreme Court.

Article IV of the agreement deals with the value of the property and, after establishing the sum of \$17,500,000 as the "temporary base value," provides that a board of three men shall appraise the property immediately. The board is to consist of a representative of the railway company, a representative of the city and a third member agreed upon by the first two members or appointed in case these two disagree. "They shall immediately proceed to appraise and determine the fair value of the property of the company actually used and useful in the operation of the lines, including all property from which any revenue is derived under the terms of the contract." The finding of the board is final and only subject to review by a court.

The cost of the appraisal is to be paid by the railway company and the value determined is fixed as the sum upon which returns are to be based. This value is only subject to change due to abandonments or betterments involving capital accounts. Any dispute as to additions or abandonments is to be arbitrated.

The rate of fare is dealt with in Article V. A single uniform fare is to be charged and universal free transfers are to be given. The commissioner may, however, direct a transfer charge to be put in force, and he may likewise cause to be put in force a larger fare on "owl cars." The fare charged varies from time to time as described later and eight rates of fare are provided for, rate E to go into effect at the beginning of operation under the agreement. The several rates are as shown in table on page 232.

Rate	Cash	Tickets
A.....	3 cents	six for 15 cents
B.....	4 cents	seven for 25 cents
C.....	5 cents	ten for 45 cents
D.....	6 cents	nine for 50 cents
E.....	7 cents	ten for 65 cents
F.....	8 cents	ten for 75 cents
H.....	9 cents	twelve for \$1
G.....	10 cents	eleven for \$1

In Article VII it is provided that at the beginning of the contract the sum of \$300,000 from the company's working cash shall be deposited to a separate account to be known as a "balancing fund." The fund is augmented or decreased, of course, depending on the total cost of operation.

Article V goes on to say, with reference to the variation of rate of fare, that "when the 'balancing fund' shall exceed the sum of \$300,000 by the sum of \$200,000 on the first of any month on the first day of the following month the fare shall change to the next lower rate, and shall continue to change each month until the 'balancing fund' is found to equal or exceed \$500,000." When the balancing fund on the first of any month is less than \$200,000 the fare shall advance to the next higher rate on the first of the following month and continue to advance on the first of each month until the balancing fund shall exceed the sum of \$300,000." These provisions do not apply until the rate then in force has been in operation three months. Provision is also made for adequate advance notice to the public of a change in fare. A minimum of one week is required.

Article VI makes provision for the return to the company based on value and rate of fare.

The company is to receive as its sole income a return on the base value which is fixed by the rate of fare in force. For fares of 7, 8, 9 or 10 cents the return is to be 6 per cent per annum. For a 6-cent fare the return is 6.5 per cent; for 5 cents, 7 per cent; for 4 cents, 7.5 per cent, and for 3 cents 8 per cent. If a transfer charge is ever introduced it is not to affect the rate of return paid the company.

The important questions of disposition of revenues and the provision and definition of funds are the subject of Article VII. There is first provided a "general fund," in which all revenues of the company shall be first deposited and accounted. From this fund shall be paid:

1. Operating expenses, which shall include:
  - (a) Maintenance of ways and structures.
  - (b) Maintenance of equipment expense.
  - (c) Traffic expense.
  - (d) Conducting transportation expense.
  - (e) General and miscellaneous expense. (Each lettered subhead is further divided into many detailed items.)
2. All taxes, including federal, state, corporate and income taxes properly allocated to operations hereunder.
3. The return to the company on the base value and the temporary base value.
4. The compensation and expenses of appraisers.
5. The salaries of the commissioner and his assistants, and all expenses in connection with the commissioner's office.
6. All other expenses which the company and commissioner agree should be paid from the general fund.

#### RENEWAL AND DEPRECIATION FUND

There is then provided a renewal and depreciation fund, to which shall be credited a sum equal to 2 per cent per annum of the base value, which sum, however, may be increased or decreased by mutual agreement of the company and commissioner. These charges shall be computed and made monthly. This fund is to be expended only for renewals and replacements, it being

the intent that the cost of maintenance shall be met and paid as an operating expense.

The "balancing fund," already referred to, receives all moneys remaining in the "general fund" after payments provided for have been made. Computations and transfers are to be made monthly. On the other hand, if accounts due and payable out of the "general fund" exceed the amount therein the deficit shall be made up by transfer from the "balancing fund."

This fund's "normal" value is a part of the base value and includes all allowance for working capital. The commissioner may require the company, however, to provide other cash for temporary or emergency purposes, to take advantage of favorable markets, etc., but the company is allowed interest at 6 per cent on all such cash advanced, and if it costs the company more than 6 per cent it shall be reimbursed, the additional cost to be paid as "operating expense."

Bond discount, required in case of financing extensions or betterments, shall be an "operating expense" and paid from the "general fund."

#### EXTENSIONS AND ABANDONMENTS

Article VIII provides that extensions, betterments and permanent improvements may be proposed by the company or the commissioner and shall be carried out only when the commissioner shall direct. The work is to be done largely by the company organization, although contracts may be made if approved by the commissioner. Disputes as to the method of handling specific cases are to be settled by arbitration.

The commissioner is limited in his orders for direct expenditures for extensions and improvements to the sum of \$400,000 after the expiration of the fifth year of the term of the agreement and other financial limitations are placed on such expenditures unless both the company and the commissioner approve the expenditures, in which event no limitation is placed on the sum to be expended.

The city has the right to finance and build any lines or extensions it desires and turn them over to the company for operation. The company when operating such lines is to reimburse the city for their cost and this sum is to be added to the base value. The city may also retain ownership while permitting the company to operate lines or extensions so constructed and financed.

The commissioner may direct the abandonment of any property, including real estate, which he deems no longer useful or which he believes should be replaced. The value of this abandoned property is to be subtracted from the base value.

The suburban lines, covered in Article IX, are under the jurisdiction of the Public Service Commission, but come under the cost-of-service agreement in the event the city enlarges its corporate limits to include them.

Article X disposes of a local controversy and Articles XI and XII provide for the usual protection and non-sale or transfer of property and for the company's liability to the public.

Article XIII is devoted to arbitration. Arbitration is provided for only those cases specified in the agreement and specific exceptions are taken to any arbitration as regards rate of fare, base value, rate of return or interpretation of the agreement.

The company must notify the commissioner within five days after receipt of his order in order to take advantage of any arbitration clauses.



The arbitrators are to consist of a company representative, a city representative and a third man selected by the first two arbitrators. In the event they cannot agree on a man he is to be appointed by the senior justice of the Supreme Court for the Seventh Judicial District.

The arbitrators are instructed to investigate and try the matter before them in a formal manner in accordance with established rules of evidence and procedure. The arbitrators are paid on a fifty-fifty basis by the city and company.

Breach of contract is provided for in Article XIV. A penalty of \$500 a day in liquidated damages may be recovered in a civil suit, which shall be paid out of income and not revenue.

Articles XV, XVI, XVII and XVIII contain miscellaneous provisions for the modification of existing contracts, for various minor matters, for the legality and legal effect of the contract and for the termination and renewal of the agreement. Article XIX provides for the official execution of the contract by the Mayor of the city and the president of the company.

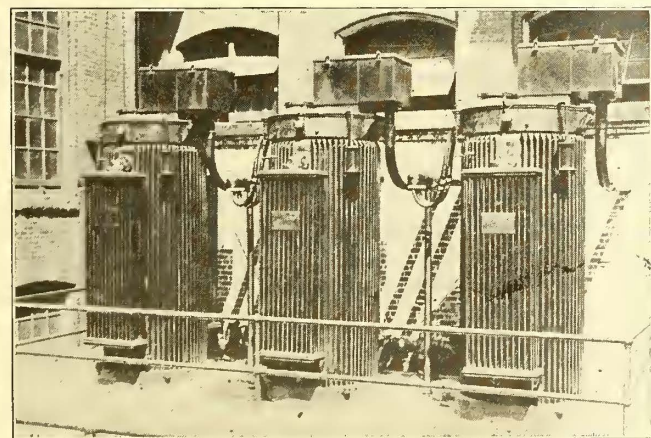
CONCLUSION

The terms of the contract are in general similar to other cost-of-service contracts, although the power of the commissioner is itemized in more detail. The commissioner has more duties to perform than any one man in a railway organization has been able to perform in the past, so no doubt he will require an experienced and numerous staff to carry out his duties. This agreement offers one more opportunity for actual trial with the cost-of-service type of franchise.

Outdoor Installation of Transformers

THE General Electric Company has developed a new type of bushing for outdoor type transformers of moderate voltage. This bushing, which has received the approval of the inspection department of the Associated Factory of Mutual Fire Insurance Companies, should make it possible to dispense with transformer houses. These transformer houses are specified, in some locali-

ties, by insurance companies, their construction being determined by insurance requirements and safety first considerations.



TRANSFORMER INSTALLATION AT PACIFIC MILLS, LAWRENCE, MASS.

ties, by insurance companies, their construction being determined by insurance requirements and safety first considerations.

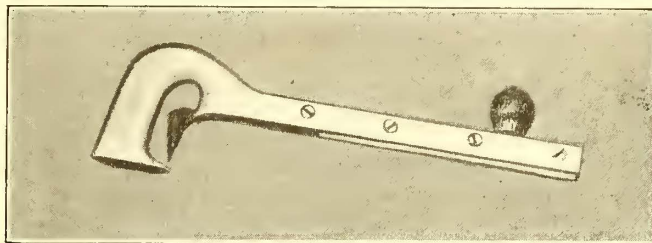
The scheme provides that all circuits, generally above 600 volts, be brought to the housing in underground cable. This cable above ground is in a metal duct which

is securely fastened to the transformer cover, all exposed parts being at ground potential and waterproof. The waterproof feature is essential, from the underwriter's standpoint, in making it safe for firemen to play streams on burning buildings near the transformers without danger.

Since the circuits to the transformer will generally consist of waterproof lead-covered cable, provision is made in the outboard portion of the housing for enclosing a standard end bell, corresponding to the circuit voltage. Ample clearance is provided in the housing. The transformers receive standard high potential test with housings in position and without any taping or other insulation on the bushings. The use of these transformers is only limited, as regards voltage, by the voltage limits of the underground cable.

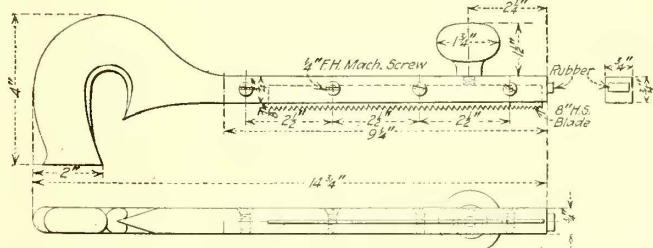
Hand Saw for Mica Undercutting

IN THE shops of the Wilkes-Barre & Hazleton Railway and the Lehigh Traction Company, Hazleton, Pa., the majority of the mica undercutting on the armatures is done by hand. For this work a special saw has been made under the direction of James W. Brown, superintendent of shops.



THIS ALUMINUM FRAME WITH ORDINARY HACKSAW BLADE MAKES A LIGHT AND EFFICIENT SAW FOR MICA UNDERCUTTING

The main body of the saw frame consists of an aluminum handle, made in a local foundry, according to specifications furnished by the railway company. As is clearly shown by the accompanying drawing, only one-half of the blade arm is aluminum. The other half is made of brass, primarily with the idea that the thread for the screws would hold better in brass than in aluminum. An ordinary 8-in. hacksaw blade is used and is clamped in position by means of four screws which pass through the aluminum side of the frame and are threaded into the brass side. These screws do not pass



CONSTRUCTION DETAILS OF HAND SAW FOR UNDERCUTTING MICA

through the saw blade, so the latter is readily adjustable for depth of undercutting by loosening the screws. A piece of hard rubber is set into the end of the saw, so that the striking of the saw at the end of the slot will neither be annoying nor harmful. The knob handle on the top of the saw is from a controller handle.

## Letters to the Editors

### Engineering Organizations to Be Listed

DEPARTMENT OF COMMERCE, BUREAU OF STANDARDS,  
WASHINGTON, D. C., July 16, 1920.

To the Editors:

In the issue of the *ELECTRIC RAILWAY JOURNAL* for July 10 you call attention to the need for a handbook of technical and allied organizations. The Bureau of Standards has long recognized this need and has in an advanced state of preparation a bureau report that will list about 150 technical and commercial organizations either actually engaged in or interested in engineering standardization. It is believed that this report will fill the need, felt by many engineers, for an authoritative and up-to-date list of organizations, giving their purpose, their membership, extracts from their constitutions and addresses of their secretary. It is hoped to publish the report in the near future and to make revisions as needed.

F. C. BROWN.

### Interurbans Also Have Problems

THE WINONA INTERURBAN RAILWAY COMPANY  
WARSAW, IND., July 21, 1920.

To the Editors:

I have your inquiry concerning the rumor that part of the Winona lines between Warsaw and Peru is to be abandoned, but this rumor is without foundation.

Our situation is very much like that of other traction companies in that we are headed for the readjustment rocks as fast as we can go. If a favorable solution of the problem is not reached in a short while there is no question but that a large number of interurban lines will receive through tickets for the junk heap.

As I view the matter, the interurban industry has been swallowed up and lost in the general discussion of the traction problem. In these days the public thinks of the traction problem as a situation having to do with the street railway industry of our larger cities and but little attention is paid to the problems confronting miles and miles of interurban roads connecting thousands upon thousands of cities, villages and hamlets.

It would seem to me that city street car service and interurban service are entirely different operations and should therefore be treated as separate industries. Street railway problems are purely local and each city line is confronted with operating conditions which are substantially different from those of a city line in another city. An interurban property performs an entirely different service. Its traffic, instead of moving between city blocks, moves between cities, and is therefore not governed by the policies of street railway operation. Interurbans perform practically the same service as steam railroads.

I notice that the *JOURNAL* of July 10 contains very little if any reference to interurban lines. The discussion is almost entirely directed toward city operation. Please refer to the articles, written by Messrs. Pardee, Dana, Rawson, Higgins and others to see my point.

Why not have some discussion on the interurban situation, entirely independent of the street car mess? Why should we allow the local problems confronting

Toledo, Cleveland and other cities to permeate the entire industry, and in particular to be made a factor in the discussion of the interurban situation.

I like the sentiment expressed in your editorial "What We Are Going to Do." If we handle our end of the problem the public will do the right thing.

J. C. SCHADE,  
General Manager.

[Some of the articles in the issue of July 10 referred to interurban problems. That of Mr. Lewis, for example, was almost entirely on this subject. But we invite further contributions on ways by which their peculiar problems may be solved.—EDITORS.]

### Locomotives for Gothard Line

OERLIKON, PRÈS ZÜRICH, July 8, 1920.

To the Editors:

The United States consular report by Trade Commissioner Groves on Swiss railway electrification, mentioned on page 1159 of your issue for June 5, contains an error where it says that "the locomotives for the Erstfeld-Bellinzona line are being built by Brown, Boveri & Company of Baden." This is not true, as all of the locomotives for the freight trains on order for the Gothard line, which practically consists of the Erstfeld-Bellinzona line, are being built and have in part already been delivered by our own firm and the Swiss Locomotive Works of Winterthur, the two firms dividing the work among themselves somewhat the same way as the Westinghouse company and the Baldwin Locomotive Works in your country divide the work on the construction of Westinghouse-Baldwin locomotives.

Furthermore, the Brown, Boveri locomotives are not being built by that firm alone, but jointly with the Swiss Locomotive Works. Will you kindly correct your note in one of your early issues.

ATELIERS DE CONSTRUCTION OERLIKON.

## Association News

ATLANTIC CITY CONVENTION, OCT. 11 TO 15

### Representative at Traffic Officers' Convention

THE American Electric Railway Association will be represented at the meeting in San Francisco on Aug. 23-27 of the National Traffic Officers' Association. W. H. Maltbie of the United Railways & Electric Company of Baltimore, a member of the association's committee on code of traffic principles, will be the association's representative at the meeting, at which he will present an address on traffic regulation from the standpoint of the electric railways. Mr. Maltbie, among other things, will advocate the adoption of the principle that street cars are entitled to the right of way on their tracks.

The Traffic Officers' Association is an organization of the traffic officers of the police departments in the different cities, and one of the principal objects of the convention is to frame a model motor vehicle act to be placed before the various state legislatures and the provinces of Canada. Electric railway companies which are especially interested in this subject could well send representatives to this convention.

# News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

## Service at Cost Urged

**New York Commissioner Recommends Flexible Rate Plan for City Lines —Sees Fare Reduction**

Adoption of a cost-of-service plan on the traction lines of New York City was urged in a statement issued on July 25 by Public Service Commissioner Lewis Nixon of the First District. Commissioner Nixon declared that, in his opinion, the making of service-at-cost agreements with the various operating companies would result in an ultimate reduction in fare.

Commissioner Nixon issued his statement in the expectation that several railways would shortly apply to the Public Service Commission for fare increase under the decision of the Court of Appeals confirming the commission's power to raise fares under certain conditions. Mr. Nixon outlined a tentative program for the New York City lines as follows:

Each of the present railroad systems to be simplified by the consolidation or merger of its constituent companies into one railroad corporation, and, if possible, a unified control of all systems brought about.

All holding companies (not railroad companies) should be abolished.

Perpetual franchises to be surrendered and to be replaced by terminable or indeterminate franchises.

All leases and underlying contracts to be terminated.

The city to have the option of acquiring the properties at an agreed valuation. If the city so elect, the purchase price may be amortized out of earnings.

A flexible fare to be provided, automatically adjusted to meet the cost of service. The cost of service should be so fixed as to cover reasonable return on values, the rates paid on such investment to be those warranted by fixed rather than speculative return.

### FAIR RETURN URGED

A standard of service of car-mile per revenue passenger to be fixed arbitrarily for six months between certain limits. During such time careful investigation should fix such limits definitely.

Recommendations covering the purchase of new equipment and the putting into effect of service to secure greater efficiency shall be submitted.

The investment which is entitled to return shall be determined by a committee of three to be named by the Court of Appeals, if it can so act, of which one member, however, shall be nominated to the court by the city.

The cost of service fare should yield a fair and adequate return upon the cost of capital actually invested in the plants, and this does not mean the cost of reproduction nor the carrying of obsolete, worn-out or dead equipment or facilities.

Outstanding bond and other capital issues must be weighed with full history of their issuance, the prices received for the same and the disposition of the proceeds.

All superseded property cannot be considered in an estimate, but due consideration as to possibilities to amortize such property out of returns shall be given, and if the committee should conclude that any such property is a proper charge to be included in the cost of property entitled to a return, it shall be added or carried in a suspense account and charged to operating expense over a term of years.

A system of accounting based upon that

of the Interstate Commerce Commission, modified to suit the requirements of the local situation, is to be established. The standard of service, of course, must be maintained.

The investment account, once determined and approved, is to be increased or decreased only with the approval of the Public Service Commission.

### REPLACEMENT FUND PROPOSED

There shall be established a renewal and replacement reserve, maintained by the payment thereto of a certain percentage of the investment in depreciable property, and an injuries and damage reserve, maintained through credits and charged to operating expense.

State and city taxes to be considered as a part of the cost of service; the federal income tax, however, to be a matter for separate adjustment.

The flexible fare control fund shall be formed by crediting to it returns in excess of the cost of service. This fund to have an upper and lower limit controlling the decrease respectively in fares.

## Railway Helps in Housing Inquiry

The Kansas City (Mo.) Railways is co-operating with the Chamber of Commerce in an investigation of the housing problem. The industrial department of the chamber has conducted a preliminary investigation, responsive to statements that demand for houses was far beyond the supply. Less than 10 per cent of industrial establishments to which questionnaires were sent returned answers indicating the need of houses, for rent or purchase, by their employees. On the face of these partial returns, the housing situation does not appear to be serious. Still it is known that several large employers have kept men constantly busy looking for living quarters for employees. The difficulty of securing co-operation in the inquiry, from the many industrial plants, has caused the industrial committee to look to the Kansas City Railways for more definite data.

The general situation is somewhat confused by the inclination of workers who have lived in Kansas City several years to declare their need for residences, such need being a desire for better homes than they have been occupying. The railway, however, is constantly employing men who have not previously lived in Kansas City; and many of these are unable to find homes to which to bring their families from other towns, or from the farms. The railway is therefore inquiring into the need for homes for its employees, the kind of homes desired, and the availability of such homes. This report, when completed, will be the basis of further action by the Chamber of Commerce. Tentative plans are now being made definite, for organizing and financing a housing corporation on such scale and with such program of building as may be necessary in the light of the further data soon to be at command.

## Will Accept Award

**Bay State Officials and Carmen to Abide by Findings of Arbitration Board**

Acceptance of findings of the arbitration board which is considering the demands of the employees of the Eastern Massachusetts Street Railway, Boston, Mass., has been promised by Homer Loring, chairman of the public trustees of the company, and James H. Vahey, counsel for the company. Mr. Loring and Mr. Vahey have advised Chairman Ogden of the arbitration board of their intention of abiding by the board's decision.

The company has defaulted with regard to the payment of interest on bonds to the extent of \$725,604 for the year ended June 1, 1920, and \$2,014,225 on the payment of dividends, Mr. Loring told Chairman Ogden. Under a moratorium clause of the mortgage, unpaid bond interest to the extent of \$461,625 and a penalty of \$92,325 must be paid before Dec. 30 of this year or the bonds defaulted.

### SUPERVISORY FORCE REDUCED

The witness testified that \$500,000 was expended by the road last winter in fighting snow and ice, \$326,000 of which was spent in February. He said that a saving of \$196,310 was effected by the road during the year ended May 1, 1920, by reducing the supervisory force from 925 employees to 700 and a saving of \$34,900 was made by cutting down the salaries of the executives. He said that every time the fare has been increased, no matter how slight, there has been a reduction in traffic.

Mr. Loring said that the State of Massachusetts "has made a mistake almost approaching a calamity" in allowing street railway lines to close down, and he pointed out that while millions of State money have been spent to make good roads, the railroads, the carriers of the working people, have been allowed to deteriorate and to be abandoned.

### 151 MILES DISCONTINUED

Mr. Loring said that since the receivership went into effect, in 1918, 151 miles of lines have been discontinued out of a system of approximately 900 miles. Many lines were continued for months with the company taking substantial losses in the effort to maintain service for the public, but when the equipment became useless through wear, the lines were finally dropped instead of built up, because the company's treasury could not stand the burden.

## P. R. T. Men Patient

### Employees Postpone Wage Advance Until Company Secures More Revenue Through Fare Readjustment

Confidence in President Thomas E. Mitten of the Philadelphia Rapid Transit Company was expressed by representatives of all employees of the company by the casting of a unanimous vote to wait until the company's revenue increases in volume to the amount necessary to pay increased wages which became effective May 16 and June 1, 1920. The unanimous vote of confidence cast by the 250 employees' representatives was indorsed by their fellow-employees when they made known their decision upon their return to the company's shops, carhouses and offices.

**T** E. MITTEN expressed his appreciation of the result accomplished by the co-operative committeemen and those whom they represented. The action of the convention followed an address by Mr. Mitten in which he reviewed the agreement between the company and the men, by which the wages paid in Philadelphia are determined by the average maximum wage of four cities: Chicago, Cleveland, Detroit, Buffalo. Mr. Mitten said, in part:

The wage established by the average paid in these four cities up to May 1, 1920, produced a maximum rate of 65 cents an hour for trainmen in Philadelphia; wages in other departments adjusted in a similar ratio.

On May 16, 1920, Detroit increased its maximum wage for trainmen from 60 cents to 75 cents an hour.

Chicago, on June 1, 1920, increased the maximum rates for the trainmen from 65 cents to 80 cents an hour.

Chicago actually began giving the men the increased wage on July 15 and expects to pay the amount due for high wages for the period between June 1 and July 15 by installments.

In the early experience, under the co-operative plan, in 1913, the company's earnings fell off in such large volume that the 22 per cent fund, which then controlled the wages paid to the men, was insufficient to support the maximum rate per hour then established.

#### COMPANY GOES MORE THAN HALF WAY

The company, however, did not reduce the wages because of the deficit in the 22 per cent fund, but for more than two years paid out more money in wages than the 22 per cent fund produced.

The time is now here when the men have an opportunity to reciprocate. The company, in paying the 65 per cent rate, anticipated increased receipts from the tariff filed with the Public Service Commission.

The wage scale established on the 65-cent basis represents an increase above the 58-cent rate of \$2,300,000 annually.

The new rate established by the latest increase at Detroit and Chicago will produce a maximum rate of 72½ cents an hour for trainmen with wages of other departments adjusted proportionately. This represents another increase in wages of approximately \$2,250,000 annually, making a total of \$4,350,000 increased wages accomplished in 1920 by applying the average of the four cities on the basis of wage adjustment in Philadelphia.

#### HIGHER FARES MUST PRECEDE WAGE RISE

The company cannot pay this further increase to the men until the Public Service Commission permits the collection of such additional revenue from the passengers as will make the payment of this larger wage possible. I, therefore, submit for your consideration the following plan:

(a) That the wages based on the 65-cent rate at the present time being paid should not now be disturbed.

(b) That as soon as the increased revenues received by the company permit the new rate based on the 72½ cent rate should be made effective and paid to the men from the date forward.

(c) That the wages shall at that time be made retroactive to the dates upon which Detroit and Chicago advances were effected: May 16 and June 1, 1920. That the amount due to each man from the advanced wage from May 16 to June 1 paid to the date upon which the payment at the new rate is begun in Philadelphia shall be credited to his account and the sum total paid over

to each employee as quickly as the increased earnings will permit.

Indorsement of the action of the representatives has been filed by the employees in every branch of the service and letters received by the management explicitly state:

We will stand back of President Mitten to a man in anything he does in connection with the management of the Philadelphia Rapid Transit Company, knowing full well from past experience that our cause is in good hands, and we approve this action of our representatives with three hearty cheers and best wishes for his success in all his undertakings.

The action of the P. R. T. men is hailed by the Philadelphia *Public Ledger* as indicating a new spirit of co-operation between management and labor. In a long editorial dealing with the P. R. T. case the *Ledger* said:

It is an astounding situation. We have all known vaguely that Mr. Mitten has had extraordinary success in dealing with his men. And there is no more important factor in the success of any enterprise involving a large labor problem today. But it will come as a cheering surprise to the people of Philadelphia that Mr. Mitten cannot only get the hearty and efficient co-operation of his men when he is raising their wages and meeting their demands, but that he can carry them with him to a man even in this grinding era of high prices when he asks of them that they keep on working at lower wages and permit him to put off an already pledged increase of pay. That is surely the record. If any other great executive has been able to do this, we have not heard of it.

The men voted confidence in Mitten and paid for the privilege of doing it. Only a record of just dealing, sympathetic treatment and faithful adherence to promises can have won so complete a trust. We stress this point, for it is of vital importance in this period of labor unrest and the unmeasured mischief which flows from it, that Philadelphians should appreciate how valuable an asset they possess in a manager of their most important public utility who can establish and maintain such relations with his men. A similar *entente cordiale* between other executives and their employees would save this nation a pile of money, a vast amount of worry and an industrial and transportation disorganization which does much to keep up the high cost of living.

Commenting in similar vein upon the stand taken by the men, the Philadelphia *Evening Star* said on July 26:

It shows that "Tom" Mitten has won and enjoys the genuine confidence of his men and that they trust him. It shows that Mr. Mitten is a phenomenal manager of labor, since he has won such confidence, and it shows that under the co-operative scheme which Mr. Mitten devised and set up the personnel of the P. R. T. employees has reached a very high standard, for unless the men of the company were of a high standard they would not be equal to this very expressive and potent "gesture," as our friends in diplomacy would call it. This emphasizes once more what we have often commented upon, that the Mitten management has shown the way to gain real co-operation between employer and employee. While strikes and conflicts are the order of the day and employers and employees almost everywhere are bickering, the employees of the P. R. T. to a man and by the motion of one of them, which received more seconders than could be re-

corded, decided upon this self-sacrifice in order to support the man at the head of the company.

There is a good augury in this. It shows what may be accomplished by fair and decent treatment of employees and what support employees will give their chiefs when they know their chiefs mean well by them. Unrest and revolution may rear their ugly heads where they will, we have still the instance of this noble act and we see from it that the American workingman is still a man and an American in all respects and that he quickly responds to fair and decent treatment.

## Des Moines Outlook Clears

### Council Plans Valuation of Railway System, with View to Higher Fare—Sliding Scale Proposed

The first definite step looking to a solution of the traction muddle in Des Moines, Iowa, was taken last week when the City Council of Des Moines took steps to employ an expert to determine the true valuation of the plant of the Des Moines City Railway and to report back to the Council. In introducing the resolution in the Council for the employment of an engineer, Commissioner Budd stated this was the first step in a movement which he would foster toward a sliding scale of fares. The resolution was unanimously adopted and steps will be taken at once looking to the retention of an expert.

#### DIFFER ON VALUATION

Later in the week the Council called into consultation Max Toltz of the firm of Toltz, King & Day of St. Paul, and discussed with him the plan of trying to arrive at a fair valuation of the plant. At the present time there is a difference of \$2,500,000 in the valuation claimed by the Des Moines City Railway and that placed on it by H. W. Byers, special counsel for the city of Des Moines in its statement with the public service corporations. Mr. Toltz, in his conference with the Council, advised that such an investigation as the Council desired would cost the city at least \$10,000 and would extend over a period of two months at least.

Neither the Des Moines City Railway nor the citizens' public service committee, which recently made an investigation of the local railway question, were represented at the meeting of the Council. Scott Goodrell, city traction supervisor, told the Council that at the present time the city is getting as good railway car service as the revenues of the company will permit. He stated that the only way to improve service in Des Moines is to grant an increased fare.

#### EXTRA SERVICE OPPOSED

Mr. Goodrell opposed the idea that additional cars put in service would mean additional revenues for the company and called attention to the fact that a definite test of this plan had been made a few months ago on one of the lines of the city and resulted in a loss of \$10 a day upon the extra cars put into service. Mr. Goodrell estimated the cost of operating a car eighteen hours a day as \$53.64. The

company is now operating under the direction of Judge Martin J. Wade of the Federal Court. Approximately two years ago a receivership was declared. F. C. Chambers, now general manager, and Homer K. Miller are the receivers in charge of the company.

Four years ago the company was granted a twenty-five-year franchise calling for six tickets for a quarter. During the war period the City Council allowed the company to charge a straight 5-cent fare. A year ago a special election was called on a proposition to increase the fare to 6 cents, but the measure was defeated, largely through disagreements between the union of electric railway employees and other unions of the city. Last fall Judge Wade allowed the company to make material cuts in the off-hour service, although rush-hour service is maintained at former standards.

### San Diego Employees Insured

Employees of the San Diego (Cal.) Electric Railway share in a life, health and accident insurance plan started recently by the Spreckels companies in San Diego and San Francisco. Both life insurance and the pensions are given without cost to the employees. The health and accident insurance is furnished through the newly organized Spreckels Employees' Mutual Benefit Association. Each member allows the company to retain 50 cents a month out of his pay, and a like amount is contributed by the company to a fund which is to provide free medical attention to the employees and members of their families, and an income of half their regular wage for a period of not more than twenty-four weeks in cases of sickness or accident not covered by the state industrial insurance. Hospital service is allowed in exceptional cases or where it is necessary to operate immediately, or where a member is living alone.

The insurance plan is based on length of service and provides the following payments to beneficiaries:

Over sixty days but less than six months, \$150.  
 Over six months but less than nine months, \$175.  
 Nine months but less than one year, \$200.  
 One year but less than two years, \$250.  
 Two years but less than three years, \$300.  
 Three years but less than four years, \$400.  
 Four years but less than five years, \$500.  
 Five years but less than six years, \$600.  
 Six years but less than seven years, \$700.  
 Seven years but less than eight years, \$800.  
 Eight years but less than nine years, \$900.  
 Nine years and over, \$1,000.

J. A. Moon, assistant to Traffic Manager M. J. Perrin, is the electric railway employees' representative on the board of directors of the Employees' Mutual Benefit Association. He holds the position of assistant treasurer. Other members are: H. P. Wellman, chairman, San Francisco; W. G. Blackie, treasurer, San Francisco; Walter Ramage, secretary, San Francisco; F. E. Miles, auditor, San Francisco; W. A. Turquand, vice-chairman, Hotel del Coronado; C. A. McGrew, assistant secretary, San Diego Union; H. D. Huff, assistant auditor, San Diego.

## Mayor Urges Sympathetic Attitude

### Norfolk Executive Pleads for Co-operation Between Municipalities and Utilities—Sees City Ownership a Failure

Pleading for closer co-operation between public utilities and the communities which they serve, Mayor Albert L. Roper of Norfolk, Va., in addressing the convention of the Southern Gas Association in that city recently, appealed for a more sympathetic attitude toward public service corporations. Mayor Roper laid especial emphasis upon the fact that adequate transportation is essential to every city and town. He deprecated the "short-sighted, penny-wise and pound-foolish policy" adopted by many city councils whereby railway systems are starved to death at the expense of the community. Mayor Roper stated that if he had his way he "would prop up every public utility on its last legs and keep it going through times of stress and tribulation." The expression of Mayor Roper's views is of especial significance because of the action recently taken by the city authorities with regard to the local lines of the Virginia Railway, Light & Power Company. Under his direction the city of Norfolk has entered upon a valuation of the company's property for the purpose of fixing a fair return on the capital invested. The matter of a just return for gas has already been agreed upon.

**M**UNICIPAL ownership is a failure, according to the Mayor. He also regards the idea of a fixed fare as "just as idiotic as to say that potatoes shall always sell for 40 cents a peck, regardless of what it costs to produce them." He believes that every utility is entitled to a rate sufficient to take care of fixed charges and operating expenses and, in addition, to a fair return on the investment.

Mayor Roper said, in part:

In welcoming to Norfolk an organization such as this, I do not feel that I am welcoming to the city a set of men who are engaged in a private industry. As a matter of fact, you are a part of the greatest fabric of civilization in this country. Manufacturers of gas are to be placed, of course, in the same rule as the men who furnish us transportation. We have had a great deal of misunderstanding about the public utility people. I speak with a great deal of sympathy for the gas men, as I do with a great deal of sympathy for the seller of transportation, because I believe that he has been misunderstood. For years it was the outdoor sport of some of the politicians of this city to do every conceivable thing they could to block the game of the public utilities of the city. It made no difference what was the virtue of the proposition which was being put forward by the public utilities. Because it was desired by the public utilities, it was wrong. As a matter of fact, these bickerings went on to such an extent that there was no possibility of getting through the Council anything resembling a fair settlement of the difficulties and differences between the city and the public utilities.

You can readily understand what a short-sighted, penny-wise and pound-foolish policy that is. It was due to a very large extent to the public utilities; it was due to an equally large extent to the municipal authorities; both were wrong. They were wrong simply because the public utility man went at his game from the standpoint of the return on the dollar invested. The only apparent idea for the operation and perfection of their plant was that they must get the largest possible return from their invested capital. I say they were wrong in that. The municipalities were wrong, on the other hand, in that they felt that the public utilities should conduct a philanthropic enterprise, losing sight of their invested capital, and give service regardless of the cost. These opposing views are the cause of the clash all over the United States and all over the world, and are responsible for the difficulty through which certain classes of public utilities are passing today.

#### DEPRECATE MUNICIPAL OWNERSHIP

One of the remedies suggested for the evil was public ownership of the public utilities. Personally, I do believe, except in a very modified degree, in public ownership of public utilities. I may go so far as to say that so far as our national Government is concerned, I think the sooner they let go of some of the things they are trying to do at the present, the better business is going to be and the more promptly we are going to get back to that normal to which all of us fondly look.

This whole proposition seems to me a very simple matter. I can see no difference between the man who sells potatoes and the man who sells service, whether it be gas, electricity or transportation. The man who sells potatoes takes into consideration the amount of money he has invested in his establishment, the cost of producing those potatoes, his loss on the potatoes that spoil, and his overhead operating expenses, adding to that a certain amount agreed upon as profit.

#### FIXED FARE CONDEMNED

The idea of a fixed price or unit for the sale of transportation, to me, is just as idiotic as to say that potatoes shall always sell for 40 cents a peck, regardless of what it costs to produce them. Therefore, I am in favor of that attitude toward the public utility by a municipality, which shall provide a revenue to the public utility sufficient to take care of the invested capital, depreciation, the overhead costs, and, on top of that, a fair return on the investment. The fare may be 5 cents a unit of travel today, may be 6 cents tomorrow, it may be 10 cents six months from now, and a year from now it may be 4½ cents. But whatever it is, the man who invests his money in service, whatever type the service may be, is entitled to a fair return upon his investment over and above what it costs him to produce that service, just as truly as the man who buys trees, cuts them and makes them into hewed lumber and sells them is entitled to a fair return.

The whole thing comes back to this: That the municipality has a right to expect all the service that the public utilities can furnish consistent with their operating costs and a fair return. The public utility, on the other hand, has no right to expect a larger return for its investment than is consistent with the service it renders. Do not look at the one and not look at the other; there is a mutual relation. It is this co-ordination of interest which brings about and is going to bring about that condition of affairs in our economic world, so far as you gentlemen are concerned, which you desire and which, I believe, any self-respecting community is going to desire.

#### CITY HURT BY BANKRUPT UTILITY

People have said to me, "Let the old traction company go hang, it would be a good thing if it did go into bankruptcy." My reply was, "I don't know what the effect on it will be by being bankrupt, but God knows I don't want it to go into bankruptcy from the standpoint of the city of Norfolk."

I trembled to think what would happen, what would be the confusion, what would be the interruption to business, if our public utilities were put into bankruptcy. The first step taken when a receivership occurs would be that the non-profitable, non-paying lines would be stopped, and our suburbs would be without transportation. The only things that operate under receivership conditions are the short hauls, where lines can make money easily, and no receiver is going to do anything solely for the municipality, as his business is to develop, to demonstrate what he can do with the lines. Do not talk to me about this business of bankruptcy for public utilities. If I had my way, I would prop up every one I saw on its last legs and keep it going through times of stress and tribulation, in order that the time might come in the development of such enterprises when it could live on the substance furnished it.

## Toledo Vote Enjoined

### Judge Killits Enjoins Submission of City Bond Plan to Voters— Measures Held Illegal—Doherty Accepts Service-at-Cost

There will be no referendum on the twin bond ordinances designed to acquire and construct a municipally owned transportation system for Toledo, Ohio, as scheduled for the primary election on Aug. 10. Judge Killits, of the Federal Court, upon hearing of the arguments on dismissal of the injunction suit brought by the Toledo Traction, Light & Power Company against the county election board, granted the injunction on July 24. As an evidence of good faith and at what was claimed to be a real sacrifice, Henry L. Doherty, as chairman of the board of the Toledo Railways & Light Company, pledged the company's acceptance of the Milner cost-of-service franchise ordinance with the valuation of \$8,000,000 as finally fixed by the commission and sent to Council by Judge Killits.

**M**R. DOHERTY took care not to admit that this was the true valuation of the traction property but said that in the interest of a quick settlement and to stop "inflammatory talk," he would agree to accept the \$8,000,000 figure as a compromise. This turn of affairs makes it impossible for the two plans to come up at the November elections.

#### BOND PLAN HELD ILLEGAL

The contention of the company in the injunction suit was hinged upon the legality of the twin ordinances for bond issues aggregating \$7,000,000. The city officials and counsel for the election board admitted that one section of the city charter had not been complied with in their passage through Council. The Judge, who helped to write the charter a few years ago, ruled that this particular section of the city charter was mandatory and that the ordinances were therefore illegal.

The most interesting of all of the developments in the hearing of the case came when the court attempted to find out what the mysterious "plan" of the municipal ownership enthusiasts was. Chairman Henry Ashley, of the commission which drafted the plans; Councilman Harry Curtis, campaign manager for the bond ordinances; City Service Director David Goodwill, who headed the valuation commission, and other members of the municipal ownership commission were subpoenaed by the court to help get at the facts. Most of the city officials disclaimed any knowledge of a particular plan for the using of the money. The traction interests claimed that there was an ulterior motive in the efforts to put through the bond issues.

#### WOULD ABANDON MANY LINES

There are in the present system of the Toledo Railways & Light Company 116 miles of track. Chairman Ashley said his plan was to eliminate seven of the present lines and to have a system containing only sixty-five miles of track. This he admitted would deprive thousands of people of service now furnished by the Rail-Light. He said the plan for limited trackage was based upon maps showing density of population, but he would not indicate where lines would be built.

He declared that the present railway system would be dismembered through condemnation proceedings. He indicated that there were no more than six-

teen miles of the present system that the commission would consider worth keeping in the municipal system.

The so-called "system" was to have a series of radial lines in the congested districts of the city carrying passengers out to the one-mile or two-mile circles, and from these points to use buses for the completion of trips. The present city is plotted in some directions out as far as the eight-mile and ten-mile circles. Mr. Ashley proposed to have a five-minute service on the railway and a ten-minute service with buses.

#### PLAN CALLED "FUTURISTIC"

The real purpose of the ordinances became apparent when Mr. Ashley told the court that the people had been brought up on the slogan of "millions for defense but not a cent for tribute." In 1914 the people ratified a plan to issue bonds for \$8,000,000 to be pledged against the street car property. This plan was never carried out, but the ordinances still remain. It developed that the municipal ownership plan might have in it the use of \$7,000,000 derived from general credit bonds, the \$8,000,000 authorized to be levied upon the traction property itself, and a scheme to "extend the credit of the city without bonds" as Mr. Ashley put it.

Passage of the Milner ordinance has been urged by Judge Killits, who maintains that in enacting the measure the city would be in the position of offering a fair plan of settlement.

#### Five-Cent Rise in St. Louis

The Missouri Public Service Commission, sitting as a board of arbitration on the wage demands of the employees of the United Railways of St. Louis, has awarded an increase of 5 cents per hour, retroactive to June 1. There is to be no changes in hours and working conditions. This increase will make the schedule of platform wages as follows: First year men, 55 cents; second year men, 60 cents; third year men, 65 cents. Extra men are guaranteed a minimum of \$100 a month provided they shall be available for service at heavy loading points for collection of tickets and issuing of transfers, when required.

The wages of other employees for whom a specific rate per hour was demanded is to be increased 5 cents per hour. The payment of back wages is to begin on Aug. 1, and the company

will have to Jan. 1, 1921, to pay the back wages. Counting the present increase as 10 per cent, the increase in street car men's wages since June 1, 1918, has been slightly more than 115 per cent.

## Twin City Board Reports

### Arbitrators Recommend Higher Fare and Pay Increase in Minneapolis— Council Takes Action Soon

After a series of meetings lasting three weeks the arbitration board sitting at Minneapolis, Minn., has made two sets of recommendations looking to settlement of the demand for increased wages by the trainmen of the Minneapolis Street Railway. The report to the City Council recommends sanction of increases of fare from 5 cents to 7 cents, with four tickets for a quarter. The report to the company recommends increase of trainmen's wages 10 cents an hour, or to a maximum of 70 cents, the increase to be retroactive thirty days from date of sanction of an increased fare by the Council.

It was announced that an ordinance would be introduced July 30 for action by the City Council along lines indicated in the board's report. Owing to the probability of objection by the seven socialist aldermen to an immediate second reading of the ordinance draft, postponement of action until Aug. 6 is the outlook.

The increases outlined in the board's wage recommendation to the company are as follows:

First year men, 55 cents per hour; second year men, 58 cents; after two years, 60 cents. Trainmen working more than nine hours a day to be paid for each hour or part thereof over nine hours: First year, 65 cents; second year, 68 cents; after two years, 70 cents. All bonus men and extra men to be paid not less than \$4.30 a day. Except in emergencies, such as cases of fire, failure of power, storms, etc., trainmen shall not be required to make additional trips unless willing to do so.

Schedules will be based as follows: 40 per cent of runs to be completed in eleven hours; 20 per cent to be completed in twelve hours; 40 per cent to be completed in thirteen and one-half hours. The company shall furnish eight-hour runs to those who wish them.

Every trainman shall be allowed vacation leave with pay at the rate of one day a month for each month of service from July 1, 1920, month by month or at one time, as desired, providing the employee has worked for the company at least one year.

Other employees working at hourly rate shall receive a 20 per cent increase.

Employees receiving yearly compensation are increased as follows: Not more than \$1,800 a year, 20 per cent; not more than \$2,400, 20 per cent on \$1,800 and 10 per cent on all above that sum; not more than \$3,600, 20 per cent on \$1,800, 10 per cent on \$600 and 5 per cent on remainder.

W. S. Bemis, who has been chosen to make a physical survey of the St. Paul City Railway as a basis to discover whether the company is entitled to an increase in fare from 5 cents upon improving the service as ordered by the Council ordinance, has taken the preliminary figures to Chicago for consultation with E. W. Bemis, who is the expert employed for this valuation.

Meanwhile trainmen of the Twin City Rapid Transit Company are holding in abeyance their strike order dependent on prompt action by the Council of the two cities.

## Buffalo Strike Averted

Intervention by Governor Postpones Threatened Walk-out—State Board to Pass on Demands

Danger of an immediate strike of platform men on the local and inter-urban lines of the International Railway, Buffalo, N. Y., has been averted by Gov. Alfred E. Smith, who has ordered an investigation into the financial affairs of the company by the State Labor Board. The first session of the board was held in Buffalo on July 29.

Although the stage had been set for a strike because of the failure of the arbitrators elected by the men and the company to agree upon an umpire to settle the wage question and other grievances after almost two months, officers of the Amalgamated Association refused to call the walkout. "By striking we would be playing into the hands of the company, which favors a strike to break the union and establish an open shop," said William B. Fitzgerald, international organizer of the Amalgamated.

### SETTLEMENT IN SIGHT

The intervention of the State Labor Board in the dispute has had a soothing effect upon the situation with the result that it now is believed the two arbitrators can get together and agree upon an umpire. President Herbert G. Tulley of the International has withdrawn his demand that only a member of the Public Service Commission should serve as umpire.

The State Public Service Commission in a decision handed down by Chairman Charles B. Hill holds that it is without authority to intervene in the situation and no member or official of the commission could sit as umpire in the arbitration proceedings. President Tulley contended that any increase in wages granted the employees by the arbitrators should be passed along to the car riders in the form of increased fares because the additional revenue received from the 7-cent fare already is being paid to the employees in higher wages. By voting to increase the wages of the company's employees, President Tulley believes that an official of the Public Service Commission sitting as umpire in the arbitration proceedings would be in a position to know the company's financial condition and to give relief by having the commission grant another fare increase.

### RAILWAY'S FINANCIAL NEEDS

A review of the financial condition of the International by the State Labor Board is expected to bring about the report that the company is not in a position to grant additional wage increases at this time. The report of the board would be used by the company in making its application to the Public Service Commission for another fare increase, to which the municipal authorities say they will enter vigorous objections because of the company's failure to enter into negotiations with

the City Council for a service-at-cost agreement proposed by Mayor George S. Buck some time ago.

### CLOSED SHOP AN ISSUE

The great question in dispute between the union platform employees and the railway is the "open shop." The company insists that it will never again sign a contract with the Amalgamated. The present contract expired May 1. President Tulley has told the men he will insist upon the open shop principle hereafter. The union originally demanded a wage increase for platform men from 48 to 88 cents an hour. The company immediately raised the men to 60 cents an hour, an increase of 12 cents an hour. The union asked for an eight-hour day, but the company said no concession in hours could be granted. President Tulley has agreed, however, that if the men in the shops, carhouses and power houses express a desire for an eight-hour day after the wage question is settled, that provision can be written into the contract.

Mr. Tulley on July 29 addressed to Lieutenant-Governor Walker, chairman of the State Labor Board, a letter outlining the company's position. Mr. Tulley stated that "the company is desirous of establishing more direct contact with its men, and will enter into no further contract which does not recognize and assure uninterrupted continuance of the open-shop principle."

## Labor Poll Concluded

United States Chamber of Commerce Members Vote Against Public Utility Strikes

The members of the Chamber of Commerce of the United States have voted almost unanimously against strikes being permitted on public utilities. It will be remembered that last month the chamber decided to take a referendum on two questions relating to anti-strike legislation for public utilities. These questions, which were published on page 1268 of the issue of this paper for June 19, follow:

(1) Should strikes by employees of all public service corporations performing public service essential to the lives, health, security, comfort and well being of the people by law be explicitly enjoined?

(2) Should suitable tribunals be created by law to adjudicate differences between the employees of public service corporations and their employers, and the decisions of such tribunals be final and binding upon both parties?

On the first question the vote was: for, 1564; against, 97.

On the second question the vote was: for, 1571; against, 100.

In addition to this referendum, one was conducted at the same time on industrial relations in general, including the right of open shop operation and the right of employers and employees to deal directly with each other without participation by outside interests. There were in all twelve questions in this referendum, and the vote gave overwhelming approval among other things, to the open shop, to the right for direct dealing, and to condemnation of a restriction of productive effort or output.

## Wage Increase Refused

Ohio Electric Unable Further to Raise Carmen's Pay—Men Asked Closed Shop Policy

The Ohio Electric Railway, Springfield, Ohio, on July 24 returned to its motormen and conductors, unsigned, a new contract which the latter had presented a few days previously. J. H. McClure, vice-president of the company, in a letter to the men, said the company is not now in financial condition to grant an increase in wages and called attention to the fact that increases had been denied on several of the company's city lines. The only place where an increase has been given was on the Zanesville line, and this was only a slight advance.

The company is now confronted with the question of a source of sufficient revenue to pay operating expenses and taxes and to maintain the property in proper physical condition for safe operation, he said, and he suggested that the present agreement be continued until at least some of these difficulties are out of the way.

### MEN ASKED CLOSED SHOP

Demands made by the men include an agreement on the part of the company to meet and treat with accredited officers and committees of the union on all grievances; to refuse, after a thirty days' trial, to retain any one in its employ who proves unsatisfactory to the union; to employ only members of the union and to see that those applying for positions shall first secure permission of at least two members of the executive committee. This would mean a closed shop contract.

The proposed contract provided that the workday be figured on a ten-hour basis, all runs to pay for ten hours and all time over ten hours to be paid for at the rate of time and one-half. The wage scale demanded was as follows: For the first three months, 75 cents an hour; for the next nine months, 77 cents an hour; for one year and thereafter, 80 cents; freight helpers, 55 cents and an additional 10 cents an hour for freight train crews. The men now receive from 41 to 50 cents per hour on the interurban lines and 38 to 47 cents on city lines.

In addition the men asked for free annual transportation books for employees on city and interurban lines, trip passes for members of their families on request and a vacation on pay for fifteen days at least once a year.

## Increases in Wages in Oakland

The San Francisco-Oakland Terminal Railways, Oakland, Cal., has increased the pay of its city trainmen as follows:

	Old Rate, Cents	New Rate, Cents
First three months.....	48	52
Next nine months.....	52	55
Second year and thereafter....	54	59

On the interurbans the increases were:

	Old Rate, Cents	New Rate, Cents
First three months.....	50	54
Next nine months.....	53	57
Second year and thereafter....	55	61

## Gas Situation Critical

Leading Official of New York Company Summarizes Situation in Statement—Coal Question Grave

The situation of the gas companies, as many readers of this paper know, is somewhat like that of the electric railways. They are faced with largely increased expenses for coal and other materials essential in the manufacture of gas, with consequent need for corresponding rates. George B. Cortelyou, president of the Consolidated Gas Company of New York, recently summed up the situation in the following words:

The emergency is immediate and far reaching. It embraces the entire industry. The economic conditions—many of them of world-wide extent and influence—affecting the supply of coal, oil and other essential materials required in the manufacture of gas, of labor and of the funds needed to maintain and develop our properties are not bogies invented by the industry to secure preferential treatment, excessive rates or unwarranted returns upon investment. They are plain facts.

All over this land today gas companies, great and small, are rendering, often under most adverse conditions, this service so vital to the welfare and comfort of our people. What they need and should have, in the interest of the public, is the reasonable certainty of adequate rates, a sufficient supply of coal, oil and other necessary supplies and such manufacturing and operating conditions as will utilize and conserve these materials as well as contribute to all other possible economies of production and distribution.

### Joliet Increase Accepted

The Chicago & Joliet Electric Railway, Joliet, Ill., effected a settlement with its car and shop men on July 1 on the basis of the original offer of the company, the wage scale per hour being as follows:

Main line, interurban division	65 cents
Lyons, Lockport & Dellwood Park divisions of interurban line	62 cents
Joliet city lines:	
First three months	56 cents
Next nine months	58 cents
Second year and thereafter	60 cents

Nine hours will constitute a day's work, with time and one-half for overtime.

All other employees will receive corresponding increase of 10 per cent over the old scale.

At a special meeting of the men, on June 30, eighty-five voted to accept the company's proposition against fifty-six voting to reject the offer.

### B. R. T. Men Ask 30 per Cent More

Demands for wage increases and improved working conditions were presented on July 28 to William S. Menden, general manager of the Brooklyn, (N. Y.) Rapid Transit Company, by a committee representing the three Brooklyn locals of the Amalgamated Association of Street and Electric Railway Employees of America. The committee, which was accompanied by P. J. Shea, International vice-president of the union, planned to submit similar demands to H. Hobart Porter, vice-president of the Brooklyn City Railroad.

The committee demanded an eight-hour day, with a limit of twelve hours for those on swing runs, and time and one-half pay for all overtime. Other

demands are: For surface motormen and conductors, from 84 cents to 92 cents an hour, the present schedule being from 52 to 62 cents an hour; switchmen and car cleaners, 55 cents an hour. For Sunday and holiday work, 10 cents extra an hour. A six-day week and a twelve-hour rest period after each day's work.

For elevated conductors, 87 cents to 90 cents an hour is asked. The present rates are from 54 cents to 57 cents. For guards on the elevated and subway lines from 82 to 85 cents an hour is demanded, the present pay being from 49 to 52 cents an hour. The contract under which the men are now working will expire on Aug. 28.

## News Notes

**Japan Planning Electrification.**—A bill has been introduced by the government in the Japanese Parliament creating the Imperial Electric Railway. The aim of the bill is to establish electric power supply for railroads and gradually to convert roads to electricity.

**Arbitrators Meet at Alton.**—A board of arbitration composed of L. C. Walcott, David M. Walsh and C. E. Smith met on July 21 to consider the question of the wages to be paid the trainmen of the Alton, Granite City & St. Louis Traction Company, Alton, Ill. The men, who have demanded an increase in wages, are now receiving from 46 to 51 cents an hour. The present fare in Alton is 8 cents.

**Offers Fifteen per Cent Rise.**—Clinton Q. Richmond, general manager of the Berkshire Street Railway, Pittsfield, Mass., has offered the employees of the road a wage increase amounting to 15 per cent. The men previously rejected an offer by the company for an advance of 10 per cent. Carmen now receive \$4.50 for a nine-hour day. They ask \$6.50 for an eight-hour day.

**Wages Raised on Interurban.**—A wage advance of 15 cents an hour has been granted the trainmen of the Rochester & Syracuse Railroad, Syracuse, N. Y. The pay of shopmen and freight handlers has also been raised. The trainmen have been receiving 47 cents an hour. They demanded 90 cents, but compromised on 62 cents. A request for an eight-hour day in place of the present ten-hour one was denied. The pay increase is retroactive to May 1.

**Will Arbitrate Newport Wages.**—Articles of arbitration have been signed by officials of the Eastern Massachusetts Street Railway, Boston, Mass., and representatives of the carmen of the company's Newport, R. I., division. Two members of the board of arbitration which will pass on the carmen's

demands for higher wages and changes in working conditions have been named. H. Lloyd Rooney will represent the union, while Robert S. Goss of Fall River will represent the company.

**Ask 75 Cents in Memphis.**—A demand for an increase in wages to a scale of 75 cents an hour has been presented to T. H. Tutwiler, receiver for the Memphis (Tenn.) Street Railway by the company's employees. Under the present contract, which expires July 31, the men receive from 42 to 48 cents an hour, depending on the length of service. An important provision of this contract is that if no agreement as to the rate of pay for the ensuing year can be agreed upon by July 31 the men will remain at work, and the scale of pay, whenever it is agreed upon, will be retroactive to Aug. 10.

**Improvements Wait on Wages.**—Until the wage scale reaches a minimum of 52 cents an hour there will be no money spent on improvements to the system of the London (Ont.) Street Railway. The system is being operated by the Ontario Railway & Municipal Board, and the men are working for 48 cents an hour, with the understanding that when the receipts warrant it they will receive an increase in pay. Citizens are dissatisfied with the service and the cars. In regard to the latter, many are declared to be antiquated, and only a few of them are equipped with air brakes. But the men demand that they shall come first, and that all improvements must wait on the wage increase.

**Tramway Carmen to Compete.**—*Partners*, the magazine of the Dallas (Tex.) Railway, has been awarding \$1 a month for the best true-to-life story submitted by employees. The Denver (Col.) Tramway *Bulletin* in a recent issue says that it too is interested in what the carmen do with their spare time. It will go even further than *Partners*. Two prizes of \$1 each will be offered to the tramway employees. The first award will go to the contributor of the best true-to-life story and the second prize will go to the contributor of the funniest story. When possible the stories will be printed in the *Bulletin*, whether or not they are among the prize winners.

**Bus Hearings Continue.**—The Board of Estimate in New York City devoted last Wednesday morning to hearing arguments against a proposed general bus system. The principal spokesman was Arthur G. Peacock, counsel for the Interborough Rapid Transit Company. Others who appeared in opposition to the bus were representatives of the employees of the New York Railways and of real estate interests and tax-payers' associations. An important protest was registered by the Brooklyn Chamber of Commerce, which declared that a city-wide bus system would further complicate the existing transit difficulties and increase the discomfort of the public. During the session Mayor Hylan denied he was committed to any plan of city transportation.



# Financial and Corporate

## West Penn Does Well

Net Income Available for Dividends on Line in Pan Handle Increased 22 Per Cent

A remarkable increase in earnings for the year ended Dec. 31, 1919, is shown by the West Penn Railways, Pittsburgh, Pa., with a balance to surplus of \$678,693 after all dividends on both preferred and common had been paid. This is an increase over 1918 of 77 per cent. Passenger revenue increased 13.7 per cent, and although the operating expenses increased 18.8 per

consolidation the preferred stockholders have increased from about 1,400 to 2,450.

## Bay State Lines Losing

All but one of the "home rule" districts of the Eastern Massachusetts Street Railway, Boston, Mass., are falling behind, according to testimony presented by Homer Loring, chairman of the public trustees, before the board of arbitration which is hearing the demands of the system's employees for higher pay. All but Fall River have

## P. R. T. Application Fails

Financial Relief Refused by Public Service Commission Pending Fixing of Valuation

The financial outlook for the Philadelphia (Pa.) Rapid Transit Company took on a graver form on July 26, when the State Public Service Commission issued a ruling suspending for the present the proposed increase in fare in the shape of a 3-cent charge for transfers on the P. R. T. lines. The commission's order is made pending an appraisal of the P. R. T.'s property. The commission's action came as a surprise, and for the present at least deprives the company of additional revenue estimated at \$3,000,000 annually.

### REVENUE NEEDED FOR WAGES

The company had counted upon the additional revenue to meet the higher wages which were to have been paid the employees, but which the latter recently waived following a statement by Thomas E. Mitten, president of the P. R. T., on the company's financial condition. The company had hoped to place the 3-cent exchange rate in effect on Aug. 1. As the commission will not sit again until September, there is little hope of an increase before Jan. 1.

The commission also rendered a decision in which it refused to dismiss the demurrers filed by the Northwestern Business Men's Association attacking the payment by the P. R. T. of rentals to its underlying companies. These rentals amount to \$10,000,000 annually and have been the subject of much discussion between the city and the company. The decision opens the whole subject to review, although there is some doubt as to the jurisdiction of the commission. The underlying companies were given ten days in which to file an answer to the suit and a hearing was set for September. The board of directors of the P. R. T. on

### INCOME STATEMENT—WEST PENN RAILWAYS

Year ended Dec. 31	1919	1918	% Inc. over 1918
Total railway revenue.....	\$10,634,611	\$9,352,905	13.7
Total railway operating expenses.....	6,801,227	5,722,236	18.8
Net operating revenue.....	\$3,833,384	\$3,630,669	5.6
Taxes (excluding Federal income and profits tax).....	357,295	269,491	32.6
Operating income.....	\$3,476,089	\$3,361,178	3.2
Non-operating income.....	452,256	365,296	23.8
Interest charged to improvement accounts.....	201,387	34,278	487.0
Gross income.....	\$4,129,732	\$3,760,752	9.8
Deductions from gross income:			
Interest on funded debt.....	\$1,916,348	\$1,708,442	12.7
Interest on floating debt.....	69,830	85,390	-18.2
Amortization of discounts.....	113,750	160,079	-28.4
Dividends paid on stocks of subsidiary companies.....	192,952	195,314	-1.2
Total deductions from gross income.....	\$2,292,880	\$2,149,225	6.7
Net income.....	\$1,836,852	\$1,611,527	14.0
Federal income and excess profits taxes.....	192,686	263,705	-27.0
Net income available for dividends.....	\$1,644,166	\$1,347,822	22.0
Dividends paid.....	965,473	965,473	0.0
Balance to surplus.....	\$678,693	\$382,349	77.5

cent, the net operating revenue is on the increase with a percentage change of 5.6 over 1918.

The net income available for dividends increased 22 per cent. This increase is mainly due to the interest charged to improvement accounts being increased 487 per cent and the total deductions increasing only 6.7 per cent, while the gross income increased 9.8 per cent.

### NET INCOME INCREASES

The passenger revenue increased to a greater extent than the car miles or car hours. The net income increased 1.42 cents per car mile or 7.9 per cent over 1918, while it increased 16 cents per car hour, or 8.4 per cent. The operating ratio appears to be increasing instead of decreasing, the increase being slightly over 4 per cent.

The West Penn Railways and its subsidiary railways own and operate 339.25 miles of electric railways, largely interurban, in Western Pennsylvania, the Pan Handle of West Virginia and eastern Ohio. The company was created in May, 1917, by a consolidation of a company of the same name, West Penn Traction Company and a number of other affiliated street and interurban railways in Pennsylvania whose lines formed a connected system. Since the

showed deficits since September, 1919, when the "home rule" plan was put in operation.

The Fall River district showed a profit between Sept. 1, 1919, and April 30, 1920, of \$44,105. The deficits of the

### STATISTICAL INFORMATION—WEST PENN RAILWAYS

Year ended Dec. 31	1919	1918	% Inc. over 1918
Miles of single track.....	339.25	339.25	0.0
Total car miles (passenger and express).....	9,436,320	8,935,660	5.6
Total car hours (passenger and express).....	888,919	844,226	5.3
Ratio CM to CH (speed m.p.h.).....	10.6	10.58	0.2
Passenger revenue.....	\$10,634,611	\$9,352,905	13.7
Passenger revenue per mile of single track.....	\$31,390	\$27,600	13.7
Statistics, per car mile:			
Operating revenue.....	\$1.127	\$1.046	7.7
Operating expenses (cents).....	72.10	64.20	12.3
Net income (cents).....	19.47	18.05	7.9
Statistics, per car hour:			
Operating revenue.....	\$11.97	\$11.07	8.1
Operating expenses.....	\$7.65	\$6.78	12.8
Net income.....	\$2.07	\$1.91	8.4
Operating rates—per cent.....	63.8	61.2	4.2

other districts for the period of "home rule" operation were enumerated as follows:

District	Deficit
Chelsea.....	\$373,313
Lynn.....	138,606
Salem.....	199,869
Gloucester.....	130,589
Lowell.....	70,574
Lawrence.....	112,351
Haverhill.....	68,180
Hyde Park.....	98,838
Quincy.....	278,411
Brockton.....	135,249
Taunton.....	86,637
Hull-Ingham.....	3,507

July 26 elected Frank Buck, a large stockholder, and W. C. Dunbar, financial vice-president of the company, directors to succeed Horatio G. Lloyd and C. W. S. Packard, resigned. The seat vacated by E. T. Stotesbury, chairman of the board, was not filled. On Wednesday and Thursday of this week Union Traction stock on the Philadelphia Exchange sold at around 23 and Philadelphia Rapid Transit stock around 13. Four weeks ago Union Traction sold around 28 and P. R. T. around 18½.

## Public Service Shows Loss

Net Income for June Drops to \$4,114, Reflecting Wage Increase of \$150,000 a Month

In the statement filed with the State Board of Public Utility Commissioners by the Public Service Railway of New Jersey covering operation for the month of June, the effect of the voluntary wage increase recently granted the company's employees is clearly seen. Net income dropped to \$4,114 as compared to \$223,166 for the corresponding month of 1919. The increase in wages amounted to \$150,000 for the month.

The financial statistics as compared to the corresponding month in 1919 show an encouraging increase in gross revenue, but this is more than offset by the rise in operating expenses caused by the wage increase.

The financial statement for the month follows:

	June 1920	1919
Total operating revenue .....	\$2,242,992	\$2,083,349
Operating expenses and taxes .....	1,881,392	1,437,679
Operating income.....	\$361,599	\$645,669
Non-operating income	67,832	5,758
Gross income .....	\$429,431	\$651,427
Fixed charges .....	425,317	428,281
Net income .....	\$4,114	\$223,166

The chief item of increase in the cost of operation was the wages of motormen, conductors and trainmen, which increased from \$458,335 to \$628,015 during the year.

Of the passenger revenue last month \$2,120,736 was derived from cash fares and \$68,198 from revenue transfers. During the month the company carried 30,534,512 revenue passengers and 7,075,972 transfer passengers, or a total of 37,610,484.

## San Francisco Reorganization Hearing Aug. 30

The California Railroad Commission has set Aug. 30 for a hearing on the application of United Railroads, San Francisco, for approval of the reorganization plan.

Of the \$23,500,000 of 4 per cent bonds of 1927, holders of \$22,657,000 par value have assented to the modified plan and deposited their securities. The holders of practically all the \$5,200,000 underlying bonds have also agreed to the reorganization.

The commission has had its engineers at work checking up valuations and the hearing is for the purpose of allowing objections to be made publicly if they develop.

The reorganization committee has expressed its intention of issuing the new securities in exchange for present holdings as rapidly as circumstances will permit, but this cannot be done until formal approval of the plan is granted by the commission.

It is also the intention of the committee to pay on the new 6 per cent cumulative prior preference stock dating from April 1 last. The new prior pref-

erence stock will be given to present 4 per cent bondholders to the extent of 50 per cent of par value of their holdings. On this basis, bondholders are assured of interest at 6 per cent annually on \$500 par value of this stock, for every \$1,000 bond now in their possession.

## American Railways Reports Increase in Gross

For the fiscal year ended Dec. 31, 1919, the combined income statement of the subsidiary and affiliated companies of the American Railways, Philadelphia, Pa., showed an operating revenue of \$16,312,231. Operating expenses, including a depreciation reserve, amounted to \$11,240,406. The operating ratio was then 69 per cent. The net revenue was \$5,071,824, and with the taxes, equal to \$744,808, the operating income equaled \$4,327,016. Gross income for the year was \$4,365,270. After deducting interest, rentals, sinking fund and other charges the income for 1919 was \$1,714,831. The American Railways is a holding company. It owns and controls forty-five railway, light, power or gas companies distributed through twelve states. Of this total number nineteen are railway or traction companies.

## Sees Brighter Outlook for Utilities

Brighter prospects for the holders of electric railway and other public service securities are seen by the National City Bank, New York, N. Y., which reviews the utility situation in its July bulletin. The bank regards the present as a most opportune time to take advantage of low prices for the purchase of these securities.

In discussing the utility outlook in general and the traction outlook in particular, the bank says, in part, as follows:

June witnessed a revival of interest in public utility issues, and new issues were promptly absorbed by discriminating investors. It has been unfortunate that the investing public has neglected public utility issues during the past year, largely as a result of the tragic position in which we find some of our major traction properties. In the traction field, however, there are many situations which merit confidence. The present census is showing an enormous increase in urban population, but during the past decade there has been little increase in traction mileage. This has resulted in a great increase in the number of passengers carried, and earnings in many cases have been adjusted to a profitable basis. Corporations furnishing power and light are enjoying unequalled prosperity. The installation of electric power in factory operations has resulted in an enormous demand on the power companies to supply current. The large central stations have demonstrated their ability to produce and distribute power at such an economical unit cost that their position is permanently assured. The increased density of population is reflected in the growing demand for light, and it has been estimated that there are now 14,000,000 homes in the United States still to be supplied with electric light. Before the war public utilities securities issued by corporations of undoubted strength, based on strong values and earning powers, could be purchased at prices to yield from 5 per cent to 5½ per cent. Today, with largely increased values and increased demand for the output, the same class of securities can be purchased at prices to yield 7 per cent to 8 per cent.

## T. H., I. & E. Improves

Gross Earnings of Indiana Road 20 per Cent More Than in 1918—Traffic Increasing

For the year ended Dec. 31, 1919, the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., shows a gross earning from railway operations of \$4,480,984. This was an increase of \$749,677, or 20 per cent, over 1918. Operating expenses for 1919 were \$3,084,392, an increase of \$612,173, or 25 per cent. Net earnings were \$1,396,592, as compared with \$1,259,067 in 1918, an increase of \$137,525, or about 11 per cent. In 1918 the taxes paid were \$232,536, these payments increasing to \$262,476 in 1919. This was an increase of nearly 13 per cent.

The total maintenance charges for the year 1919 were \$1,059,898, an increase of \$349,038. Of this amount \$946,122 was expended on the railway property as against \$622,307 in 1918. The inter-urban lines carried 8,782,328 passengers, or an increase of 179,132 or 2.0 per cent over 1918. The city lines carried 16,140,623 passengers as compared with 12,984,413 passengers in 1918. This was an increase of 3,156,210 passengers, or 24.3 per cent over 1918. The company handled a total of 138,019 tons of freight and express.

The Terre Haute, Indianapolis & Eastern Traction Company has made a specialty of transporting live stock. During 1919, 1285 carloads of live stock were hauled to Indianapolis from the surrounding towns. This is an increase of 580 carloads, or 82 per cent over 1918. During 1919 a slight revision of freight rates was authorized by the Public Service Commission, which gave the company a small net increase.

The passenger rate of fare for the year was 2½ cents a mile, but the company now has a petition pending before the Indiana Public Service Commission asking that the rate be made 3 cents a mile. In the city of Richmond, the reduced rate tickets were eliminated, and the fare is now 5 cents with transfer. Wages of conductors, motormen, section men, etc., increased approximately 22 per cent during the year.

## Grand Rapids Deficit Continues

The report of the Grand Rapids (Mich.) Railway for the month of June shows a deficit of \$12,774 for the month. The gross income was \$140,718. Operating expenses were \$135,513, showing an increase of \$9,886 over the same month a year ago. The total loss for the first six months of 1920 is \$83,544. This is nearly one-third more than the loss for the whole of 1919. The report further shows that more passengers are being carried since the 7-cent fare and the rerouting went into effect. A total of 2,140,576 passengers were carried during the month, showing an increase of 123,287. The 7-cent fare went into effect June 24. Company officials estimate at least a 15 per cent increase in passengers because of the better service given.

## Richmond Value Fixed

Engineers Place Value of \$14,382,410 on Local Lines of Virginia Railway & Power Company

A value of \$14,382,410 has been placed on the Richmond, Va., lines of the Virginia Railway & Power Company by Stone & Webster, who are making a valuation of the company's properties. Announcement of the engineers' findings was made by Thomas S. Wheelwright, president of the company, on July 21. The figure placed on the Richmond property by Stone & Webster represents the "reproduction new" cost.

Historic value of the Richmond properties of the company, or the actual cash invested in the railway business under its control from the time the business was founded, is given by Mr. Wheelwright as \$20,249,400. The latter figures represent the actual investment made in the property, including interest and deducting the return.

The State Corporation Commission appointed representatives who have been following the work of the appraisers as made in Richmond and the city of Norfolk has done the same, but no action was taken by the city of Richmond, notwithstanding the company's open and continued invitations. The work at Norfolk has been completed and report has been made to the city. The work in Richmond has not been completed in all of its details.

In commenting on the company's need for a higher return, Mr. Wheelwright said:

In the statement of earnings and expenses . . . the interest charges are estimated at 5 per cent on less than \$6,000,000, and these statements show the railway is not earning 5 per cent on this sum alone, so that more than \$8,000,000 of invested capital on any basis on which the matter can be figured is not getting any return at the rate of fares now in effect.

## Housing Corporation Disposes of Road

The Richmond & Seven Pines Railway, the only road owned by the United States Housing Corporation, has been tentatively sold by the United States Housing Corporation to Oliver J. Sands, a banker of Richmond, Va.

The price agreed upon when Mr. Sands came to Washington for a conference with housing corporation officials and war-department officers was \$90,000 for the electric line and \$90,000 for the houses. The agreement is that both are to be sold together or the deal is off. Mr. Sands originally offered \$55,000 for the railroad and \$45,000 for the houses. When this offer was turned down he increased his bid from time to time until \$90,000 for each was agreed upon.

The conference was held at offices of the United States Housing Corporation. Captain Moran represented the War Department, which has an interest in the houses. The Housing Corporation, which owns the railroad outright, agreed to the prices for both the railroad and houses. Captain Moran accepted the price on behalf of the War

Department, but it was understood he would have to obtain approval of his superiors before the deal could be definitely closed.

The plan of the Government to dispose of the property was noted in the ELECTRIC RAILWAY JOURNAL for May 29, page 1115.

## Financial News Notes

**Time for Deposits Extended.**—A very large amount of the first mortgage 5 per cent sinking fund thirty-year gold bonds of the Albany (N. Y.) Southern Railroad has been deposited pursuant to the terms of the deposit agreement dated March 1, 1920. In order to give the non-depositing bondholders an opportunity to participate in the benefits of the exchange plan, the time within which bonds may be deposited has been extended to and including Aug. 2.

**Will Run Huntington Lines.**—The stockholders of the Huntington (N. Y.) Traction Company, Inc., voted at their organization meeting on July 20 to incorporate under the laws of the State of New York with the par value of the stock at \$80,000 and to purchase the property of the defunct Huntington Railroad. The following directors were elected: Henry A. Murphy, Jack Hirschfeld, Edward McNally, W. A. Dempsey, E. B. Hawkins, E. T. Dempsey, R. H. Hunt, Frank Willette and Phillip S. McNally. Edward T. Dempsey was elected president, W. A. Dempsey vice-president and Henry A. Murphy secretary and treasurer.

**Will Abandon White Plains Line.**—Supreme Court Justice Joseph Morschauser has granted to Leverett S. Miller, receiver of the Westchester Street Railway, White Plains, N. Y., permission to join in a declaration of abandonment of a portion of the Mamaroneck line from the band stand in that village to the town line, and he has also ordered that the Shore Line Electric Railway show cause before him at Poughkeepsie on Sept. 11 why the corporation should not be dissolved. These decisions are in connection with the suit of the Farmers' Loan & Trust Company against the Westchester Street Railway to foreclose a mortgage.

**Cities Service Shows Gain.**—The report of earnings for the month of June for the Cities Service Company shows gross to have been \$2,137,241, an increase of \$536,224 over June a year ago. Net income, after interest and other charges, amounted to \$1,922,442, a gain of \$542,937, leaving a balance of \$1,533,962 available for reserves, common stock dividends and surplus. Preferred stock dividend requirements were earned 4.33 times for the year ending

June 30, 1920, and for the same period \$40.13 a share was earned on the common stock outstanding. For the first half of the current year earnings applicable to the common stock amounted to \$45.66 per share.

**Equipment Trust Certificates Offered.**—The Chicago (Ill.) Trust Company, as trustee, is offering for subscription an issue of 7 per cent equipment trust certificates covering the purchase by the Trenton & Mercer County Traction Corporation, Trenton, N. J., of forty one-man safety cars from the J. G. Brill Company. The issue, which has already been authorized, will close at \$155,000. The certificates of this issue represent 65 per cent of the purchase price of the cars, the balance having been paid in cash and junior securities. Coupon certificates are offered in denominations of \$1,000 and \$500, registrable as to principal and at prices ranging from 98.76 and interest to 96.07 and interest.

**Charleston Lines Losing.**—A statement of the earnings and expenses of the Charleston (W. Va.) Interurban Railway has been filed with the state Public Service Commission at the request of City Solicitor Donald O. Blagg, who is representing the city in protesting against a rate increase applied for by the company. For the last four months the income on the city lines has been \$108,521 and, deducting operating expenses, interest on money borrowed, depreciation and costs of new equipment, the company contends that it is \$4,703 behind. Last year during the same period it lost \$22,246 on the 5-cent fare then in effect. Its total revenue on all lines, city and suburban, during the first six months of 1920 was \$431,312.

**Sale Attacked; Receiver Asked.**—R. A. Forsyth of Birmingham, Ala., a stockholder in the railway and lighting properties at Gadsden, Ala., taken over several months ago by the Alabama Power Company, has filed a bill in chancery in which he asks for a receiver for the local railway lines, the lighting plant and the ice plant. Mr. Forsyth charges that the sale of the property of the Alabama City, Gadsden & Attalla Railway and the Gadsden Railway, to the Alabama Power Company, was not a genuine one and that the price named in the deed was less than one-fifth of the actual value of the property. His petition is also in the form of a bill of discovery which seeks to declare all terms of the contract for the sale of properties illegal and to make them null and void. The petition names as defendants to the action the Gadsden Railway, the Alabama City, Gadsden and Attalla Railway, the Gadsden Ice & Coal Company, the Gadsden Railway, Light & Power Company, and the Alabama Power Company. It asks that the Alabama Power Company and the Gadsden Railway, Light & Power Company be restrained from claiming any share or interest in the property, rights, etc., of the concerns transferred to the Alabama Power Company.

# Traffic and Transportation

## Higher Fare Promised

Commission, After Hearing Connecticut Company's Plea, Announces It Will Grant Immediate Relief

At the close of an all-day hearing at Hartford, Conn., on July 29, the State Public Service Commission announced that it would issue an order on the following day granting relief to the Connecticut Company, New Haven, in the shape of a higher fare. The rate to be fixed by the commission would, it was reported, be 7 cents straight. The commission stated that its order would be temporary in character. Chairman Richard T. Higgins said that this temporary means of relief would be made permanent only if it proved to be a fair policy on a full trial. The whole matter would be adjourned to a not distant date he said, when it would come up for final action.

### DRASTIC ACTION NEEDED

Judge Walter C. Noyes, chairman of the Federal trustees of the railway, made the statement to the commission that in view of the fact that the company had lost \$87,000 during the period from June 1 to July 15, the measure of relief would have to be large and it would have to come quickly. The \$87,000, he said, was only a small part of the actual loss of the company, as it did not include rentals, interest, taxes or other items. He predicted that without relief the road would have to shut down within six or eight weeks.

Judge Noyes sketched the recent history of the company and said that he did not believe that a "wholesale" rate was in accord with sound railway economics. Such a rate was applied by the commission in the recent zone fare matter when commutation tickets were ordered for certain suburban communities. Both Judge Noyes and President Lucius S. Storrs of the company stated to the commission that the sale of these tickets had been negligible. "Commutation passengers on a street railway mean a loss to the road," Judge Noyes said. "They come at the peak hour when the road doesn't want them. There can be no justification for the wholesale distribution of commutation privileges."

### ZONE PLAN A FAILURE

Thomas J. McGreevy, an auditor of the company, presented a mass of figures to show that the distance tariff scheme which the commission ordered in effect on May 9 had not been successful. A previous distance tariff system inaugurated by the company on Nov. 2 of last year raised the operating revenues greatly, but both schemes had failed to provide sufficient money to pay taxes and rentals, let alone dividends, he said. The Bridgeport division

had an excess of operating expenses over operating revenue of \$50,000 during the month of June, Mr. McGreevy stated, the rest of the system falling behind \$65,000 during that period.

Under the proposed plan of the company, Mr. Storrs stated, a person could travel to any point within three miles of a city's traffic center for 7 cents. On the second 7 cents a person could travel from 2.2 to 2.8 miles, the company not yet having decided as to the length of the second zone. All suburban zones, he said, would be laid out on the basis of 3 cents a mile. Expressing doubt of the company's ability to operate a 7-cent fare he said:

If the 7-cent fare does not bring in more money, we shall have to get 8 cents, or curtail service, which we shall have to do immediately under the present fare system. We know that if we cut out certain unprofitable country and city lines that we can make the property pay, but we don't care to do that and we don't think the commission or the people want us to give up any of the lines.

E. A. Clark, of Hamden, one of the lawyers appearing in opposition to the company's petition, asked Receiver Harrison B. Freeman of the Hartford & Springfield Street Railway, who was attending the hearing, if it was not a fact that his company had lost patronage by raising fares. Mr. Freeman replied that under a 10-cent fare system now in operation on the lines of his road, the revenues had increased considerably over what they were when 6 cents was the basic fare.

### JITNEY SERVICE COMPLEMENTARY

There are 8,250 jitney "seats" in the state, Mr. Storrs stated, dismissing the jitney idea with the statement that jitneys should act as a service complementary to that given by the electric railway. He stated that whether the proposed increase in fare would cause the jitneys to increase in number, the company did not know. But he was certain that the situation of the company had become so bad that it would make little difference what the jitneys charged.

The hearing has firmly established the precedent set by the commission at the close of the last zone fare hearing of having rates of fare fixed at the outset by the commission. The Connecticut Company installed rates of fare on previous occasions without asking permission of the commission, and the commission acted only when it received a protest from the individuals or communities. Since the commission imposed a fare method of its own devising on the company last May, however, the Connecticut Company officials felt that they should present their petition to the commission before changing the rate basis. Thus the commission is now more powerful than at any previous time in its history.

## Public's Co-operation Asked

Bethel Selectmen Appeal to Citizens to Aid Local Railway, Threatened with Shutdown

Candidness in laying its financial condition before its patrons has secured for the Danbury & Bethel Street Railway, Danbury, Conn., the official indorsement of the town of Bethel. The Bethel Board of Selectmen has issued an appeal to the public to co-operate with J. Moss Ives, receiver of the company, in his effort to keep the road in operation. The board points out that the welfare of the community would be jeopardized by the discontinuance of electric railway service.

### "OPEN DOOR" POLICY

Mr. Ives some time ago adopted the policy of keeping the public advised of the company's condition through advertisements in the Danbury newspapers. He stated frankly that, unless the road were able to increase its revenue, service would be suspended. Recently he announced an increase in cash fare to 10 cents, stating that even with the higher rate the road might be unable to continue operation much longer if jitney competition remained unchecked.

The appeal of the Board of Selectmen follows:

To the People of Bethel:

Possibly every one in Bethel read the statement made in the *Evening News*, Saturday night, by the receivers of the Danbury & Bethel Street Railway. If so, they understand what Bethel is threatened with—the loss of its trolley service unless there is better patronage of the road within the coming month. Perhaps all do not realize what this would mean to Bethel as a town. During the past few months Bethel has had a real estate boom greater than ever before in the history of the town. While some of the sales have been to local people, many new families have come here to locate permanently. Will outsiders continue to come here if they learn that the town is such a back number that it has lost its trolley service?

### TROLLEYS CALLED ESSENTIAL

New industries have come into the town, and these factories are giving employment to large numbers of persons who are earning higher wages than ever before in their lives. Everyone is busy, there are no unoccupied houses, stores or factories; in fact, Bethel is booming as never before. Do we want this to continue or do we want to step over on the downward path again, for the loss of the trolley will mean a depreciation in the value of property.

The jitneys are run independent of any restrictions; on their own time and when and how they please. It has been said that were the trolley service abandoned in Bethel, the people of this town would pay more than 10 cents to go to Danbury and undoubtedly this is true. Another advantage of the trolley over the jitney is in spacious cars with plenty of ventilation and vehicles free from tobacco smoke, for while some of the jitneys have signs inside the buses calling on smokers to respect the ladies, it frequently happens that the drivers themselves are puffing on cigarettes or cigars, while if a smoker boards their bus nothing is said to him if he does not see fit to discard the weed.

### SERVICE IMPROVEMENT SEEN

There is no attempt on the part of the trolley company to deny that there has been ground for complaint of the service on the part of the people, but the trolley service has been entirely reorganized and better service is promised; the delays at the railroad crossing here are to be done away with, as the men operating the cars are not to leave their cars; the tedious waits on switches will also be overcome by the use of the four one-man cars which will be operated on a ten-minute headway all day between Wooster Square, Danbury, and the Greenwood Avenue crossing in Bethel. . . .

## Bridgeport Rides in Motor Buses

### Connecticut Company Stops All Local Service—Buses Flock from Nearby Cities—Good Weather Assists Jitney Men

Bridgeport, Conn., has been without trolley service since 12:01 a.m. on July 26 because of the failure of a city ordinance restricting jitneys to stand the test of the State courts. The Connecticut Company had agreed to continue service pending the hearing on the jitney men's injunction, but after the injunction was sustained gave notice it would cease service Sunday night, which it did. Jitney and bus drivers from every city in the State flocked to Bridgeport during Sunday evening and night and for the first three days helped their Bridgeport brethren handle the crowds, rush and lean hour, and on fairly well regulated schedules. However, the human weakness element of such service is getting in its work. There were approximately 500 buses in service on Monday and Tuesday. On Wednesday some of the visiting jitneys had started home, and by Thursday it was stated that the number of buses was dwindling toward 300.

**T**HERE is no doubt that the first two days of the week found Bridgeporters getting a good transportation service. The jitney men had voluntarily obligated themselves in their own association to maintain schedules and charge no more than 5 cents, and they lived up to their agreement. The rush-hour traffic was handled, but the state law that requires that a jitney shall carry only two more passengers than its designated seating capacity was smashed to smithereens in the supreme desire of the jitneys to make good. Notice from the state motor vehicle authorities that this provision must be enforced rigidly caused some dismay.

#### JITNEY RULES ENFORCED

It was this dual problem of having to start on schedule whether the bus was filled or not, and to limit rush-hour loads to the legal requirement, that caused the jitney men of New Haven, Waterbury and Hartford to start back home Wednesday night. News of the situation from the jitney men's standpoint, coupled with the expense and difficulty of registration in Connecticut, was apparently the reason why the Massachusetts and New Jersey buses did not appear in the numbers anticipated.

The second day of the fair field for the motor bus saw many of the jitney men late. Buses being individually owned, each operator is his own ultimate boss, and those who had worked from twelve to sixteen hours on Monday were too tired to show up early on Tuesday morning. Attempts were made to work out a plan of having the jitney operators work in two shifts, but no definite arrangement had been announced on Thursday.

By Wednesday evening jitney men found that handling the rush-hour load was a strain under which they were breaking down and an appeal came to the business men of Bridgeport for the co-operation in the form of staggering the closing hours. John G. Schwartz, president of the Bridgeport Bus Association, said, "We do not propose to tell the business men or the manufacturers how to run their business, but it is a fact that we have received not one iota of co-operation from either of them in attempting to handle the transportation of the city thrust sud-

denly upon us." He then suggested certain staggered hours.

#### BUSES GIVE GOOD SERVICE

Street traffic under the jitney-bus-no-street-car transportation system has been satisfactory. The buses have been requested to hug the curb, allowing more rapidly moving private motor vehicles to use the middle of the street. Congestion and crowding have been less in many cases than with the electric cars. One traffic officer who commented on this said that every time a street car stopped forty or fifty motor vehicles would pile up behind it while it was unloading and loading, and then he would have a heavy traffic group to pass over his corner. With the buses he claimed greater flexibility and freedom, and that his traffic units came in smaller groups.

Very few complaints have been received from the public with reference to the buses, except that there have not been enough of them for rush-hour transportation. There has been overcrowding, and a few jitney operators have disobeyed the fare limit and charged 10 cents.

There is no intimation as to when or whether the Connecticut Company will resume service in Bridgeport. It was at first anticipated that the city would pass an ordinance in line with the suggestion contained in the decision of Judge Banks upholding the jitney men's injunction, but indications Thursday were that the company might not receive any further legislative help from the city. Unexplained orders in the carhouse of the Connecticut Company called the trainmen to duty on Saturday, July 31, to be assigned runs effective Aug. 2. The company has made no statement on this, but some of the trolley men say it merely means an extension of some shore service out of New Haven which runs into the Bridgeport division.

#### ALL EYES ON BRIDGEPORT

The situation in Bridgeport is being watched closely by all of the other cities in the State, numbers of whom have held "town meetings," from which the various councils are trying to get opinions and data from which to base any possible jitney restricting legislation. On the whole the attitude of these meetings, as well as newspaper editorial comment over the State, has

been that the electric rail service can not be dispensed with, and that it is only fair that the motor buses be placed under restrictions similar to those placed on the electric rail systems, or that they be restricted to service which is supplementary, or at least which is not actually competitive. In the comment of the same papers and of people who support the above arguments there was a well defined attitude that the Connecticut Company has taken an unwarrantedly drastic step in Bridgeport, and a step not in consonance with the attitude of Bridgeport expressed by its attempt to pass a restricting law. The criticism is that the Connecticut Company discontinued service before Bridgeport could possibly have enacted a legal ordinance without the Mayor's having called a second emergency meeting of the Council.

In Ansonia, Waterbury, Hartford and New Haven there was during the week a noticeable decrease in the number of jitneys operating, and this was attributed in one of the "town meetings" by one of the jitney men's representatives to the fact that the jitneys had gone to Bridgeport. This proved somewhat of a backfire in his argument as to the dependence the public should place upon the jitney service.

The experience of Bridgeport so far this week and the discussion in the other cities in Connecticut have failed to produce anything very conclusive as to the final outcome of the trolley-motor bus controversy in Connecticut, with the exception of a more or less well formed public sentiment as outlined above.

#### Seattle Increase Effective

Failure to file a referendum petition before noon on July 17 calling upon the City Council of Seattle, Wash., to submit to popular vote the proposition of increasing the fare on the lines of the Municipal Street Railway has caused the 10-cent cash fare to go into effect. Owing to the delays in manufacture of the 6½-cent tokens, the advanced fares did not become effective until July 24. During the thirty days that had elapsed since the bill was approved by Mayor Caldwell, petitions had been circulated asking for a referendum vote on the subject. Filing of such a petition would automatically have prevented the ordinance becoming a law until it was voted upon by the people.

The new fare tokens, providing for four rides for a quarter, have been placed on sale on all cars of the municipal lines, at the railway office, and on busy corners in various parts of the city. Nearly 500,000 tokens were sold the first day of their use. The tokens are to be sold on the cars permanently, according to the present plan. The new fare schedule provides for a cash fare for one of 10 cents; cash fare for two, 15 cents; four tokens for 25 cents; eight tokens for 50 cents; 16 tokens for \$1. Transfers are issued on fares paid with cash or with tokens.

## Birneys in Baltimore

One-Man Cars Making Good on 3.4-Mile Belt Line Around Business District—Many Transfer Points

Standard Birney cars were placed in operation on the Fremont Avenue route of the United Railways & Electric Company, Baltimore, Md., on July 1. The line is completely equipped with the new cars and they have proved very successful. The Fremont Avenue route skirts the congested center of the city, acting as a belt line around two sides of the business district. The route intersects and transfers to and from twenty-four of the important lines of the system on a run of 3.4 miles and has twenty-four compulsory stops, including twenty-two track intersections.

### HEAVY TRANSFER INTERCHANGE

The non-rush hour running time is twenty-four minutes each way, with twenty-six minutes for the rush hours, morning and night. There is rather heavy transfer interchange at many of the intersections, and hence it was felt that this route would give an "acid test" to the use of this type of rolling stock in Baltimore. The cars were purchased from the J. G. Brill Company and deliveries began during May.

Preparatory to operating cars, in order to provide as far as possible against delays and operating trouble, the track and overhead were gone over and put in good condition and two additional electric switches were installed to facilitate operations. There is a loop at one end of the line, but at the other end, where heavy loading is encountered during evening rush hours, it has been necessary to station a terminal man to help handle the cars and assist the operator. At certain points the stops were changed from "near side" to "far side" to minimize interference with other lines.

The newspapers were kept informed of the plans of the company and were afforded an opportunity to inspect the new cars and operating methods before the cars were actually put on for public use. When the time came, however, to put the cars on the street no special publicity was employed, outside of a news item in the paper. The entire service was changed over at one time.

### THOROUGH PREPARATIONS MADE

The company in 1919 began to study the possibilities of operating safety cars of the Birney one-man type. Careful investigation was made of installations already in operation. The officials of the company went over the matter on the ground in a number of different cities. They also had the benefit of the advice of the representatives of manufacturers who have been making a service and transportation study of this new car. An investigation was made of the different lines in the system, and it was finally decided to purchase thirty-three cars for the Fremont Avenue route.

Careful consideration was given to the standard safety car then being

built for general use around the country. There were a number of things which the engineers of the company at Baltimore considered desirable to incorporate in the new cars, but it was found, due to quantity production methods of manufacture, that if the standard design was changed it would increase materially the expense of the cars and would slow down their delivery. Hence the standard Birney car was purchased without alterations in equipment or design.

### INSTRUCTION FOR OPERATORS

As soon as cars began to arrive from the builder they were operated on an unused stretch of track on off hours by the crews of the Fremont Avenue line. This line had previously had hand-brake single-truck cars on it, and the men had to be instructed in the use of the air brake, in addition to the other new devices on the new cars. Great care was taken to give these men sufficient time to qualify. Due to the frequent interchange of passengers it was particularly necessary to drill the motorman in handling transfers and fares. The pains and time given to this feature of the work were amply rewarded, because every man but one out of approximately fifty-one was able to qualify.

With the old equipment nine cars on the base schedule and twenty-one in rush hours provided the service, the car seating thirty, with a maximum allowed capacity of fifty-seven. In place of these a new schedule providing fourteen safety cars on the base and twenty-nine in the rush hours was started. The new service was augmented approximately 45 per cent over the old, as measured in car-miles per day. This service is better than any previously furnished on this route and has been of help to the company in gaining the co-operation and approval of the riders. Due to the short time the new equipment has been in service, it is not yet feasible to draw any conclusions as to operating or financial results.

## Ten Cents in Tacoma

The State Public Service Commission in a decision handed down on July 27 ordered a 10-cent cash fare placed in effect on July 28 on the Tacoma, Wash., lines of the Tacoma Railway & Power Company and the Pacific Traction Company. The companies were ordered to sell tickets at the rate of twenty-five for \$2. The new rates will remain in effect for a period of six months.

Provision was made in the commission's order that, should the city relieve the companies of the 2 per cent gross earnings tax, free transportation of policemen and other city employees, and from the terms of the franchises requiring the street paving, tickets are to be sold at the rate of fifteen for \$1. The order, from all indications, presages a war between local jitney bus associations and the railways. Several members of the City Council are admittedly in favor of jitney operation under conditions of regulation.

## City's Case Closed

Chicago Makes Final Appeal to Commission for 5-Cent Fare—Mayor Wants Safety Cars

Chester E. Cleveland, Mayor Thompson's special traction counselor, completed argument before the Illinois Public Utilities Commission last week in the effort of the city of Chicago to force a return to a 5-cent fare on the Chicago Surface Lines. The substance of the argument was that if that part of the contract between the city and the Surface Lines which specifies good service at a 5-cent fare is invalid, then the entire contract should be invalid. Or, if those portions of the contract which permit the company to operate on the streets and the city to share in the net proceeds to the extent of 55 per cent are valid, then that portion which specifies the 5-cent fare should be valid.

### MAYOR "WATCHES STEP"

In view of this position, Mayor Thompson has vetoed ordinances permitting the extension of lines as provided under the 1907 contracts and has refused to accept the 55 per cent of the net proceeds which has been tendered to him by the Surface Lines, on advice of counsel that to do these things would put the city in the position of acquiescing in the validity of the contract, while it has taken the position that the contract was forfeited when the rate of fare was increased above 5 cents.

The city administration has sent out several representatives to various points in the country to make a hurried study of safety cars, presumably for the purpose of determining whether the Chicago companies should take advantage of the economies offered by this type of equipment and thereby make possible operation at a lower fare. The investigation by the city is being conducted through Mayor Thompson's traction commission, of which Corporation Counsel S. A. Ettelson is chairman.

R. F. Kelker, Jr., transportation supervisor for the city, was sent to Kansas City, Mo., to make a similar survey, and T. E. Flanagan, his assistant, was sent to Gary, Terre Haute and Fort Wayne, Ind.

### SAFETY CARS FAVORED

While in Terre Haute Mr. Flanagan asked the opinion of Mayor Hunter on this type of equipment, and his Honor responded with the following statement.

As Mayor of Terre Haute, and resident of Terre Haute for forty-eight years, I take great pleasure in recommending to any city in need of street car service the one-man cars. They have proven to be very satisfactory in Terre Haute, and the public would not care to change back to the old style. They are quick to stop and quick to start and no danger of anyone getting hurt by getting on and off the car, as the door does not open until the car stops, and the car does not start until the doors close. They don't seem to have any trouble in making change quick or issuing transfers. We have about fifty of them in operation in Terre Haute, and they are giving good satisfaction and good service and we have no complaints from the public.

## Transportation News Notes

**Town Council Authorizes Regulation of Buses.**—The Town Council of Westerly, R. I., has authorized Chief of Police Thomas E. Brown to regulate the operation of buses in competition with the Shore Line Electric Railway from Westerly to Watch Hill and Pleasant View.

**Fare Raise Unopposed.**—An application of the Wallkill Transit Company, Middletown, N. Y., for permission to increase its fare from 5 cents to 7 cents was unopposed at a recent hearing before the Public Service Commission for the Second District. The company operates in Middletown and its suburbs.

**Ten Cents Straight on Narrow Gage.**—The Boston, Revere Beach & Lynn Railroad, Lynn, Mass., has received permission from the State Department of Public Utilities to charge a straight 10-cent fare on its narrow gage line in Winthrop. The sale of commutation tickets has been ordered discontinued.

**Jitneys Ordered from Streets.**—Thirty-one jitney drivers of Bayonne, N. J., were ordered by the municipal authorities to cease operation on July 16. The jitney men had failed to comply with the provisions of a new State law requiring the filing of \$5,000 bonds by all operators. Sixty-four jitney licenses are held in Bayonne.

**Seven Cents in Halifax.**—Halifax, N. S., is now paying a 7-cent fare. The Nova Scotia Legislature recently authorized the Nova Scotia Tramways & Power Company, Ltd., to raise its cash rate from 5 cents to 7 cents, and to sell tickets in books at the rate of seventeen for \$1. Twenty workmen's tickets are sold for \$1.

**Six Cents in Danville.**—The Board of Aldermen of Danville, Va., has passed an ordinance empowering the Danville Traction & Power Company to raise its fares from 5 cents to 6 cents. The City Council some time ago undertook an investigation of the local lines, with the view to the possibility of taking over the railway system.

**I. C. C. Order Stands.**—The Interstate Commerce Commission has refused to rescind its former action permitting the Washington, Baltimore & Annapolis Electric Railway to increase its one-way and round-trip fares between Washington and points in Maryland on that line. The new tariff became effective on July 11.

**Would Charge More in Santa Barbara.**—Application has been made to the California Railway Commission by the Santa Barbara & Suburban Railway, Santa Barbara, for permission to

charge an 8-cent cash fare on its Santa Barbara lines. The company proposes to sell tickets at the rate of five for 35 cents and school tickets at the rate of 2½ cents each, in books of forty for \$1. The company also seeks to raise the rate on its bus lines.

**Higher Fare in Gulfport.**—The Gulfport & Mississippi Coast Traction Company, Gulfport, Miss., has been authorized by the municipal authorities of Biloxi, Gulfport and Pass Christian, Miss., to raise its fares on its lines in these cities from 6 cents to 7 cents in each zone. This company has granted its employees a wage increase to a scale of 40 to 50 cents an hour.

**Wants Rise on Suburban Line.**—Application has been made to the State Public Service Commission by the Wheeling (W. Va.) Traction Company for an increase in rates on its line between Weirton and Moundsville and intermediate points. Reasons for the proposed increase are the cost of fuel, labor, and all necessary materials for the maintenance of proper service.

**Upholds Interstate Advance.**—The Interstate Commerce Commission has issued an order permitting the Wheeling (W. Va.) Traction Company to raise the fares on its line to Steubenville, Brilliant, Bellaire and Martins Ferry, Ohio. The fare from Wheeling to Bellaire becomes 10 cents. The city of Martins Ferry has brought court action to oust the company from the city streets.

**Fare Zones Rearranged.**—The collection of fares based on a 2½-cent zone was discontinued on the lines of the Connecticut Company, New Haven, Conn., formerly operated by the Shore Line Electric Railway, Norwich, Conn., on July 15. The collection of fares is now based on 5-cent zones. At the same time the use of the Rooke cash register was discontinued. Overhead clock registers are now being used.

**"Jay Walking" Banned in Knoxville.**—"Jay walking" is now punishable as a misdemeanor in Knoxville, Tenn. An ordinance barring the practice throughout the city took effect on July 12. Under the terms of the new law pedestrians in crossing streets are required to move in the direction of vehicular traffic, and are forbidden to cross streets or highways except at the regularly designated crossings and then at right angles only.

**Six Cents in Richmond.**—An ordinance has been passed by the Common Council of Richmond, Va., authorizing the Virginia Railway & Power Company to charge a 6-cent fare on its lines in that city. The company is now charging a flat 5-cent fare. Its application to the city authorities for financial relief encountered little opposition.

**Will Fight Scranton Increase.**—City Solicitor Houck of Scranton, Pa., has been directed by the City Council to take steps to protest against the proposed increase in fare by the Scranton Railway from 7 cents to 10 cents. The city authorities have been urged to carry the case to the United States courts.

**New Bus Law Proposed.**—A new ordinance has been introduced in the City Council of Philadelphia, Pa., granting permission to the Philadelphia Transportation Company to operate motor buses on Broad Street from Olney Avenue to the Philadelphia Navy Yard. The ordinance specifies no fare rate. Mayor Moore recently vetoed a measure previously passed by the Council which would have empowered the bus company to operate at a 5-cent fare.

**Interurban Raises Rates.**—A new schedule of fares became effective on the line of the Pennsylvania-Ohio Electric Company, Youngstown, Ohio, between Youngstown and New Castle, Pa., on July 20. The rate between Youngstown and New Castle becomes 50 cents and between Youngstown and Lowellville 20 cents. An advance of 10 cents has been made from all points between Lowellville and New Castle to Youngstown.

**Denies Jersey Increase.**—The State Board of Public Utility Commissioners has dismissed the petition of the Atlantic Coast Electric Railway, Asbury Park, N. J., for permission to increase the present rate of fares from 6 to 8 cents in each of its zones. The board has signified its willingness to approve a 7-cent fare in each zone. The company operates in Asbury Park, Bradley Beach, Neptune City and adjacent municipalities along the New Jersey coast.

**Wants Ticket for Workmen.**—S. Wiley Wakeman, general manager of the Fore River Plant of the Bethlehem Shipbuilding Company, in a communication sent to Forrest I. Neal, chairman of the home rule committee of the Quincy Chamber of Commerce, urges a special workman's ticket entitling the worker to a reduced fare on the Eastern Massachusetts Street Railway in Quincy. The railway has recently increased its fare about 33½ per cent on strip tickets and 100 per cent on straight fares.

**Seeking Eight-Cent Fare in Bellaire.**—Bellaire, Ohio, car riders after Sept. 1 next may be paying an 8-cent cash fare or 6½ cents for a ride on a ticket. In a communication to City Council C. P. Billings, general manager of the Wheeling Traction Company, says that a new rate schedule for fares has been filed with the Public Utilities Commission providing for those cash fares and ticket rates. The company is willing to accept the franchise passed by City Council recently, provided the rental clause is dropped and some minor changes made.

**Hearing on Portland, Me., Fares.**—The petition for a 9-cent ticket fare and 10-cent cash fare was the basis for a hearing on behalf of the Cumberland County Power & Light Company operating the Portland (Me.) Railroad, before the Public Utilities Commission. It was brought out that the deficit for the past year, so far, was \$147,000. An additional burden, at least \$100,000, would be occasioned on account of wage

increases granted by the board of arbitration. Judge Cleaves, chairman of the Commission, said that the company owed it to the public, as well as to the commission, to clear up the situation with respect to all rumors and intimations in connection with the financing of the company.

**Hearings on California Rise.**—Hearings on the application of the Pacific Electric Railway, Los Angeles, Cal., for a general increase in its rates began before the State Railroad Commission on July 15. An application of the city of Pasadena and other municipalities to have the petition dismissed was refused. The company introduced testimony to show that it had been operating at a heavy loss, the total loss up to May 31 last having been \$12,189,780. It was testified that the loss during 1919 was \$2,767,726, and that in 1918 the loss was \$1,778,191. It was further shown that wages for 1919 had been increased \$2,621,162.

**Ten Cents in Galesburg.**—The Galesburg Railway, Lighting & Power Company, Galesburg, Ill., has been authorized by the Illinois Public Utilities Commission to increase its fares from 7 cents to 10 cents, and to sell ten tickets for 75 cents. The Danville (Ill.) Street Railway & Light Company has been authorized by the commission to increase its fares from 5 cents to 7 cents. The Tri-City Railway has been granted a 10-cent fare in Rock Island and Moline, Ill., and in adjacent towns to Moline. The commission has issued an order continuing in effect the 6-cent fare now being charged by the Kankakee Electric Railway on its lines.

**Eight Cents in Rock Island.**—Eight-cent fares went into effect on July 20 on the Rock Island, Moline, East Moline and Silvio, Ill., lines of the Tri-City Railway. The increase from the former 7-cent rate was authorized as an emergency measure by the State Public Utilities Commission, pending action on the company's petition for permission to install a permanent fare of 10 cents on its Illinois lines. By the terms of the commission's order the fare for children less than twelve years of age becomes 4 cents. The company recently raised the wages of its employees from 60 cents to 70 cents an hour.

**Wants Higher Rates Continued.**—Argument was started on July 22 before the Interstate Commerce Commission on the application of the Hudson & Manhattan Railroad, New York, N. Y., to make permanent the temporary fare schedule of 10 cents uptown and 6 cents downtown, which has been in force for several months in the tubes between the city of New York and New Jersey communities. James C. Carmalt, counsel for the railroad, declared the increase in fares was necessary if the company was to continue to pay the interest on its bonds, which amount to about \$79,000,000. As an alternative, he said, the company was willing to fix a flat rate of 8 cents.

**Eight Cents in East St. Louis.**—The Illinois Public Utilities Commission on

July 23 authorized the East St. Louis & Suburban Railway, East St. Louis, Ill., to increase its fare from 6 cents to 8 cents effective July 26, to provide additional revenue necessary to meet the recent wage award. The company had petitioned for a 10-cent fare. The commission in entering the order stated that a 6-cent fare would be confiscatory and a 7-cent fare would not meet operating expenses and pay a fair return on the lowest estimated value of the company's property. The 8-cent fare is the only solution to the present high cost of operation.

**Commission's Rate Authority Upheld.**—Justice Curran has dismissed with costs the case of the city of Winnipeg vs. the Winnipeg (Man.) Electric Railway, challenging the right of the company to increase fares fixed by contract. This decision was reached on the grounds that the court of King's bench is without jurisdiction to question the validity of an order made by the Public Utilities Commissioner. Judge Curran rules that the Public Utilities act is constitutional and wholly within the legislative authority of the province to enact, but while it constitutes the Public Utilities Commission a court of record, it does not make it a superior court.

**Commends Bluefield Service.**—Following receipt of the report of W. B. Hall, assistant engineer of the State Public Service Commission, on an investigation of the complaint of the city of Bluefield, W. Va., of inadequate service furnished by the electric railway lines of the Appalachian Power Company, City Attorney John R. Dillard has asked for a public hearing. Mr. Hall reported that the car supply is adequate for the transportation of passengers within the corporate limits of Bluefield; that conductors and motormen on all cars were giving very good service considering their experience, and that while some of the cars were old and needed painting badly and a few minor repairs, as a whole the city is better equipped and is receiving better service than many cities of the same size.

**Asks More on Bus Lines.**—Following the application of the Pacific Electric Railway to the California Railroad Commission for an increase in its passenger and freight rates, auto stage lines operating out of Los Angeles to all points in Southern California, as well as operating between Los Angeles and San Francisco and way points, have applied to the State Railroad Commission to increase their fares. The Railroad Commission controls the regulation of these auto stage lines as to rates of fare, operating schedules and routes. Exhibits filed by the Motor Transit Company, operating the bus lines, show that its total operating expenses for January, February and March, 1920, were \$281,245, while its revenue from all sources was \$253,350. The number of passengers carried for this three-month period totaled 561,721 and the car-miles operated amounted to 1,401,764.

**Motor Bus Regulation in St. Louis.**—The Board of Aldermen on June 29 passed a motor bus bill providing that companies operating motor buses in St. Louis, Mo., must pay an annual license of \$25 per bus, and must pay into the city treasury 3 per cent of their gross receipts. The measure fixes the maximum fare as 10 cents, requires that each company give a bond of \$10,000 to the city and puts bus schedules under the regulation of the Board of Public Service. A fine of from \$25 to \$500 is fixed for the violation of any of the terms of the bill. Outside of the municipal buses operated in Forest Park, the only buses being operated in St. Louis are the eleven of the Missouri Bus Company, which run on fixed schedules between Sixth and Locust Streets and Delmar and Hamilton Avenues.

**May Raise Rates Again.**—Unless the books of the Cincinnati (Ohio) Traction Company show a gain in receipts for the month of July there will be an increase in fare of  $\frac{1}{2}$  cent, making the rate 8 cents flat on Sept. 1. Despite the fact that the fare was raised to  $7\frac{1}{2}$  cents by ticket or 8 cents cash on June 1, there was a deficit for June of \$13,601. Under the terms of the franchise, when the receipts are less than the operating cost for any two calendar months, the fare may be raised  $\frac{1}{2}$  cent, provided fifteen days' notice of the fact is given previous to the day on which the proposed increase becomes effective. This notice will likely be given to the patrons of the company Aug. 15. The operating revenues of the company for June, according to its report, were \$763,871. Operating expenses for the same period were \$507,401. Rentals, taxes and sinking fund and interest charges, the report shows, made the total expenditure in excess of the receipts. For the six months ended June 30 there was a deficit of \$141,108.

**Commission's Power Upheld.**—Restrictions on the powers of the cities of Utah, imposed by the public utilities law, to control by franchise utilities operating within their boundaries, were defined by the Supreme Court of Utah in deciding the case of Murray City against the Utah Light & Traction Company and the Utah Power & Light Company. The suit was brought by Murray to test the legality of the Public Utilities Commission's ruling with regard to zone systems, the order of the commission being in violation of the Murray franchise. It was alleged by the city that, in the matter of fares and zones, and also in various other particulars, with regard to the repair and grading of tracks and crossings, the franchise had been violated by the traction company. The court points out that in a similar case it held that the State, by reason of its right as a sovereign, retained the power to modify or annul a rate or fixed charge for services rendered by a public utilities, and that any order made by such a commission is a regular and binding order.



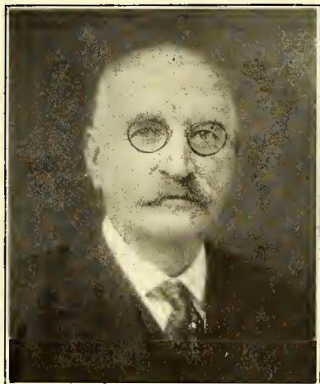
## Personal Mention

### Rochester's New Director

**C. R. Barnes, Who Will Manage Local Lines, Will Have Wide Powers—  
Takes Office Aug. 1**

The appointment of Charles R. Barnes, electrical expert for the Public Service Commission of the Second District to be the first Commissioner of Railways of Rochester, N. Y., was announced by Mayor Edgerton on July 20. The selection of Mr. Barnes to supervise the operation of the lines, in the interest of the city, under the new "service-at-cost" plan approved by the Mayor and the Common Council for the local division of the New York State Railways was noted in the *ELECTRIC RAILWAY JOURNAL* for July 24.

As Commissioner of Railways Mr.



C. R. BARNES

Barnes will have the duty of enforcing the ten-year temporary contract, which supplants the old agreement with the company. As the arbiter of disputed questions as to the character of the service he will fix the rate of fare and will determine the character and scope of the alterations and improvements to be made. No claims for damages against the company involving an expenditure of more than \$100 will be settled without his consent. In short, he will be responsible to the city for the character of the service.

Mr. Barnes is familiar with the operation of the Rochester railway system. As expert for the Public Service Commission, he has made many studies of the problems there and most of the betterments made in recent years have been in accordance with his suggestions. Operation of the lines under Mr. Barnes's direction will begin on Aug. 1. The fare will be 7 cents until Mr. Barnes is able to show earnings enough to decrease it, or, on the other hand, he may be constrained to raise the fare.

Mr. Barnes was born near Spencerport, N. Y., in 1853. He entered the employ of the New York Central Railroad when a boy. He was telegraph operator at the Spencerport village station for four years and then was appointed ticket agent and freight agent for the Rochester & State Line Railroad, now the Buffalo, Rochester & Pittsburgh Railroad. In 1880 he became superintendent of the fire-alarm telegraph office for the city and held that post until 1898, when he resigned to become electrical expert for the State Railroad Commission. Later this body was merged into the Public Service Commission, but Mr. Barnes retained his post.

W. A. Dempsey has been elected vice-president of the Huntington (N. Y.) Traction Company.

Henry A. Murphy has been elected secretary of the Huntington (N. Y.) Traction Company.

C. P. Westlake has been appointed supervisor of equipment of the Eighth Avenue Railroad and the Ninth Avenue Railroad, New York, N. Y.

C. V. Peeling, who resigned some time ago as manager of the Cornwall Street Railway, Light & Power Company, Cornwall, Ont., has become connected with the Palmetto Power & Light Company, Florence, S. C.

Edward T. Dempsey has been elected president of the Huntington (N. Y.) Traction Company, organized to take over and operate the lines of the defunct Huntington Railroad.

Russell G. Carter, Belfast, has been appointed superintendent of the Belfast district of the Penobscot Bay Electric Company, a subsidiary of Maine Power Company, to succeed H. P. Blodgett, who has been transferred to the Rockland District.

Bryant White has succeeded Graham Claytor as general superintendent of the light and power departments of the Roanoke Railway & Electric Company, Roanoke, Va. Mr. White was formerly a power engineer in the employ of the Public Service Electric Company, Newark, N. J.

John F. Stevens, a trustee of the Boston (Mass.) Elevated Railway, has been made president of the newly organized Hyde Park Transportation Department, formed to take over and operate on behalf of the city of Boston the Hyde Park lines of the Eastern Massachusetts Street Railway.

Charles D. O'Donnell, who was recently appointed superintendent of the Southbridge division of the Worcester (Mass.) Consolidated Street Railway, was presented by his friends with a gold watch and fob on July 16.

### Will Run City's Lines

**Joseph S. Goodwin Named General Manager of Detroit's New Municipal Railway**

Joseph S. Goodwin, formerly manager of the Bridgeport (Conn.) lines of the Connecticut Company, has been selected for the position of general manager of the Detroit (Mich.) Municipal Railway, the personnel of which is now being organized for the construction and operation of city-owned lines under the terms of the municipal bond issue approved by the voters of Detroit at an election on April 5. The plans sanctioned by the voters call for the construction of 101 miles of new track and for the equipping of this trackage with 400 motor cars and 150 trailers, as well as for the taking over of 55.5 miles of line now being operated by the Detroit United Railway. The total trackage provided for the city system is 156.5 miles of north and south and crosstown lines, with two routes open to the heart of the city.

Since resigning his position with the



J. S. GOODWIN

Connecticut Company early last June, Mr. Goodwin has been associated with the firm of Charles E. Morse, Inc., of Boston, with headquarters in Hartford, Conn. Mr. Goodwin was born in Beverly, Mass., in 1877. He entered railway work in 1895 as a motorman on the Gloucester, Essex & Beverly Street Railway, now a part of the Eastern Massachusetts Street Railway system. He was subsequently employed as a motorman for a short time by the Rhode Island Company, Providence, R. I.

In 1901 Mr. Goodwin entered the employ of the Hartford & Springfield Street Railway, Warehouse Point, Conn., as a motorman. He was later appointed a dispatcher of the company. In 1906 he was advanced to the position of chief dispatcher and served in that capacity until February, 1914, when he was made secretary and superintendent of the system. He was subsequently made general manager of the company. Three years ago he resigned to become manager of the Bridgeport lines of the Connecticut Company.

# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

## Strong Market for Asbestos Insulating Material

**Electric Railways Ordering in Larger Quantities—Deliveries Fair in Spite of Raw Material Shortage**

Asbestos products as used in electric insulation are in such shape as to induce an optimistic view of the situation, according to inquiries instituted in this field. Demand for this material at present is not only strong but is increasing. Most of the call is for repair work purposes, with central stations the strongest buyers, although electric railways are now buying better than has been the case during the past three or four years.

Deliveries are in pretty fair shape, and although transportation difficulties for asbestos producers have as yet given no evidence of easing up, on the item of asbestos board, for instance, deliveries can be made on large orders in about thirty days.

Production at present is said to be above normal, in spite of the fact that some shortage of raw material is experienced, which again is induced by the freight situation rather than because of an actual scarcity of raw material. Even here the situation is not characterized as "bad." The cost of asbestos fiber is very high, however, and bids fair to go still higher.

Prices on the finished material are ruling strong, with a tendency apparently to increase if any change comes about.

## Increasing Foreign Demand for Trolley Line Material

**Domestic Buying for Maintenance Work Only—Shortage of Castings Lengthening Deliveries as Prices Stiffen**

Domestic activity in the field of overhead trolley line material is not especially marked, although orders for maintenance work are in fair volume. This demand, however, is more or less spasmodic. In some quarters it is said that inquiries are increasing, but electric railways are closely watching their actual needs for ears, hangers, crossings, splicers, etc., and little or no new construction work of this sort enters the market. Foreign demand seems to be picking up, however, rather active markets being reported in South America, Mexico and Switzerland, Australia and New Zealand.

Delivery quotations show a wide variance, several producers quoting from four to eight weeks. One company is in a position to ship in about ten days, with delivery up to the railroads; still

another producer touches the opposite extreme in being unable to promise delivery under three to four months. Reasons given for these delays cover a wide range; in the case of some manufacturers it is raw material with a dearth of castings that is impeding production, and with others, who report a normal output with no labor troubles, embargoes are given as the cause of delay.

In the majority of cases stocks of

finished goods are rather flat, but here and there a condition characterized as "good" or "fair" can be found. General price increases ranging from 6 to 15 per cent came into effect on July 1, but the higher price level apparently caused no orders to be canceled. Present demands are for the most part really to satisfy the most urgent needs. Collections on sales of this material are reported at this time in a favorable condition.

## Current Fuel Needs of Utilities Secured

**Regional Priorities Act Virtually as an Embargo on Coal Exports—Home Competition and Foreign Buying Tend to Force Prices Up**

Relief may be expected in the coal situation now that the Department of Justice, the Interstate Commerce Commission and the Senate special committee on reconstruction are all devoting their attention to it. The three parties are attacking the problem from independent angles in accordance with their respective power to act, *i. e.*, prices, transportation and legislation.

Evidence introduced at recent hearings indicates that the present situation is critical. A shortage of coal stocks and of coal cars had to be faced by the coal producers and users. The mine owners contract for only a percentage of their output and sell the rest on the open market; the large consumers contract for an excess tonnage to secure a storage supply and to make sure of sufficient deliveries. When a shortage of cars and of production occurs, the mine owners reduce both the coal supplied on contracts and also the spot coal.

### ELEMENTS TENDING TO INCREASE PRICE

When the contract coal users do not receive their full quota of coal they go into the open market and try to get the spot or free coal under competitive price conditions. This competition forces prices up and a further element in increasing the prices is introduced by the fact that foreign countries are in the market for coal at any price, and also that some dealers and speculators have manipulated markets by reconsigning coal cars until conditions were tight.

John W. Lieb, vice-president of the New York Edison Company, in his testimony before the Senate committee on reconstruction gave a good picture of the situation for his specific case. The Edison and affiliated companies have a coal contract for the year which includes all the coal to be used and a storage of about 250,000 tons. The prices on this contract coal run from

\$4.25 to \$4.75 at the mine. Since Aug. 1, 1919, the "contract" coal received was only about 52 per cent of the contracted amount, with the result that the companies went into the market and purchased "free" coal at an average price of \$10 per ton. The companies were thus compelled to purchase about 30 per cent of their coal in the open market or quit business. As these companies use about 4,000,000 tons per year this means, on a 30 per cent basis, that they are paying about \$7,000,000 a year more for coal than they would need to pay if conditions were such as to permit contract deliveries.

### LABOR MAKING NEW CLAIMS

Another element in the situation is now appearing and that is labor. The previous wage adjustments were made on a normal coal price basis, and now that the men see the high prices obtained for "free" coal they are claiming a share in the extraordinary profits. The operators, however, say the wage scale was fixed by the government for a year and they cannot change it. The result has been a strike of laborers in Illinois, Indiana and Ohio, which only further decreases production and boosts the price of free coal.

The Interstate Commerce Commission has ordered all open cars to the mines and has given priority on assignments to public utilities and to certain geographical sections, particularly New England and the Northwest. This will relieve the situation for the utilities as regards their day-to-day consumption but will not permit any reserve storage for emergency conditions. It does, at the same time, amount to what is virtually an embargo on coal exports, besides an emergency use of rail equipment and a very decided increase in coal production.

A decrease in coal prices need only to be expected when there is either a

greater supply on the market or a smaller demand from consumers. The fact that there are no reserve stocks of domestic coal, combined with a nation wide propaganda, encouraged by government bureaus and coal operators, to the effect that there is a coal shortage, has created an almost hysterical demand for coal. The situation should be very much improved in the next thirty days due to the recent orders of the Interstate Commerce Commission.

## Transformer Market Continues in Active State

**Raw Material Stocks Fair—Power Transformers Quoted on Five to Eight Months Shipments**

Transformer manufacturing plants are busy filling back orders and taking on new business, although some diminution is noted in the volume of inquiries and extent of so-called proposition work, compared with earlier in the year. Not much difference can be seen in the character of buying, both power and distribution transformers being sought in about the same proportions. The passage of the national water-power act has opened the door to larger sales, sure to be realized more and more as these resources are developed. As yet it is too early for this legislation to exert a substantial effect on orders, but considerable business is looked for from Western sources as projects long imprisoned on paper are released for construction.

### MATERIALS SITUATION SHOWS IMPROVEMENT

An improved material situation as regards the heavier items used in transformer manufacture features present conditions. Manufacturers are less worried today over the supply of copper, magnetic steel and sheet iron than during the past winter. Railroad congestion has given cause for anxiety all through the year, but by strenuous efforts necessary stocks of the foregoing raw material have been accumulated in sufficient amount to permit steady production to be assured for some time. The chief difficulty has come in connection with the supply of such items as long-fiber cotton, shellac, enameled wire for primary coils, porcelain and grain alcohol.

Difficulties still exist in connection with the cotton supply, these being heightened by the large purchases of this material by the automobile industry. It has become necessary, in some cases at least, to buy shellac abroad before shipment to the United States in order to forestall complete absorption of imports on arrival. Facilities for local manufacture of enameled wire and porcelain will soon be established in at least one representative transformer-making plant, so that these materials will cause less trouble in future from the shortage standpoint.

Deliveries of distribution transformers now average about eighteen

weeks, although occasionally much shorter shipments can be made. On power transformers classed as 200 kva. and over shipment can be made in from five to eight months. There are practically no factory stocks in hand of either type. Labor conditions are fairly steady and prices have been quiet but firm since the last advances, which took place in the late winter and in the spring.

Every effort is being made through quantity production and by pushing the standardization program to hold prices close to present levels, which are still far below the advances attained in many other lines of commodities. If pig iron advances further this summer, it seems likely that transformer prices may have to undergo another upward readjustment, but there is little certainty at present about this. A bright spot in this branch of the industry is found in the results of rating standardization, which have cut the sale of specials to one-third that of four years ago and reduced the number of standards to about 40 per cent of the old figures.

## Long Island Car Purchase in Abeyance

**Decision of Public Service Commission on Application for Increased Rates Will Affect Purchase of 100 Cars**

On Aug. 2 the Public Service Commission, First District, will hold a hearing to pass upon the application of the Long Island Railroad for an increase in passenger rates. Involved in the outcome of the proceedings is the fate of 100 new passenger cars which the commission recently urged the Long Island Railroad to buy in order to care for growing passenger traffic. Replying to the request of the commission for the immediate purchase of these cars, in order to insure delivery by the summer of 1921, President Ralph Peters of the Long Island Railroad said that the financial ability of the company to pay for the cars depended upon its ability to earn the interest on the money which must be borrowed to purchase this rolling stock. As the likelihood of earning sufficient capital to meet the interest in turn depends upon the railroad's application for increased rates being granted, the hearing on Aug. 2 will have a special significance.

President Peters estimated that 100 new cars at present prices would cost about \$3,000,000. This is the second installment of cars which the Public Service Commission has requested the Long Island Railroad to buy. Nearly a year ago the first notification was followed by contracts being placed for 100 passenger cars, apportioned between two builders in amounts of seventy and thirty cars. These were ordered in December, 1919, and delivery was supposed to be made in time to meet the summer traffic of 1920. Up to a recent date but two of these cars had been delivered, with eight more reported on the way.

## Rolling Stock

The city commissioners of Calgary, Alberta, Canada, decided to call for bids on sixteen new motors for cars of the Calgary Municipal Railway.

The Springfield (Mo.) Traction Company is expecting shipment shortly of eight safety cars from the Cincinnati Car Company.

The Laconia (N. H.) Street Railway Company has purchased two safety cars from the Wason Car Company of Springfield, Mass., and delivery of the cars has been made.

Eastern Massachusetts Street Railway, Boston, Mass., lost twenty electric cars recently in a fire which swept the car barns at North Abington and destroyed four buildings. The total damage is estimated at about \$75,000. Included among the cars which burned were nine of the double-truck type, three small cars, a sand car, flat car, a line wrecker and five snow plows.

The Burlington (Vt.) Traction Company is putting into operation two new 18-ton pay-as-you-enter cars, purchased from the government, which had intended them for use in transporting shipyard workers. The cost will be \$10,500 each, but certain necessary modifications of the cars will raise this amount to \$12,000 each. Seats are provided for sixty passengers.

## Franchises

Portland Railway, Light & Power Company, Portland, Ore.—Franchises have been granted by the city and county for the construction and operation of the line on Jersey and Emerson Streets and proceedings have been started to widen the county road to 70 ft. Application will be made to the Public Service Commission to require the Portland Railway, Light & Power Company to operate the line as a part of the city's traction system. The length of the extension is approximately 1 mile and the cost will approximate \$35,000.

## Track and Roadway

Alabama Power Company, Birmingham, Ala.—A survey is to be made of the car line of the Alabama Power Company in Gadsden to determine what improvements will be found necessary.

Pacific Electric Railway, Los Angeles, Cal.—Plans are under way for the construction by the Pacific Electric Railway of a line to Sylvan Park and the University of Redlands. The line will run up Brockton Avenue to University Street and then down to Colton Avenue. The work, it is estimated, will cost about \$7,000.

Los Angeles (Cal.) Railway.—Work on extending the electric line to Holly-

wood has been started by the Los Angeles Railway. One-half mile of double track will be laid to connect with the present Western Avenue line. This new improvement will cost about \$50,000 and is part of the extensive program of \$150,000 which the Los Angeles Railway has under way.

Palmer, Mass.—The street railway company of Palmer, which is part of the Springfield Street Railway Company, is relaying its track on North Main Street in preparation for the cement roadway which is expected to be built this summer.

Detroit (Mich.) United Railway.—The Detroit United Railway plans an extensive construction program in Flint and Pontiac, Mich., for this year. The work in Flint comprises 10½ miles of track and in Pontiac it comprises about 6 miles of single track.

Interborough Rapid Transit Company, New York, N. Y.—The Powers-Kennedy Company was the lowest bidder for the construction of column foundations and embankment for storage yards for the Brooklyn service of the Interborough Rapid Transit Company. Bids were opened July 19 by Transit Construction Commissioner John H. Delaney. Seven contractors submitted bids, the lowest bid being \$407,000. In the steel construction for the same storage yard there were five bids submitted, the lowest being that of Bigelow & Nicholas for \$387,400. This yard will be one of the largest in the transit system. The steel construction must be completed within eight months and the column foundations within eighteen months.

### Power Houses, Shops and Buildings

Los Angeles (Cal.) Railway.—Two new rotary converters will be installed at one of the main downtown substations. This will approximate an expenditure of \$65,000.

Toledo Railways & Light Company, Toledo, Ohio.—The Toledo Railways & Light Company has closed contracts for the construction of a high-tension transmission line belting the city of Toledo and adjoining that of the Toledo Terminal Railroad. The cost of this work will be approximately \$1,000,000. The matter of preparing plans and securing right-of-way has been in progress for almost a year.

Interborough Rapid Transit Company, New York, N. Y.—A new subway station in Forty-second Street, between Fifth and Sixth Avenues, is planned as part of the Queensboro extension. The Forty-second Street Property Owners' & Merchants' Association is pushing forward this project, which will mean a line running west from Park Avenue. It will afford a connection with the west side subway and with the B. R. T. The station will have entrances at the east and west end, that is, one near Fifth Avenue and the other near Sixth Avenue.

### Professional Note

The California Engineering Company, consulting civil, mechanical, electrical, hydraulic and marine engineer, announces the opening of its offices at 131 Leidesdorff Street, San Francisco, Cal. Paul B. McKee is president of the company; Paul R. Parker, vice-president and chief engineer, and Byron H. Hurd secretary.

### Trade Notes

The Bussman Manufacturing Company, St. Louis, Mo., has purchased the fuse department of the Appleton Electric Company, Chicago.

The Economy Electric Devices Company, Old Colony Building, Chicago, announces that the Grayson Railway Supply Company, St. Louis, Mo., has been made its representative in the southwest territory.

Herman L. Wittstein, recently works manager of the Chapman Valve Manufacturing Company, Springfield, Mass., has been appointed production manager of the Morris Metal Products Company, Bridgeport, Conn.

The Locke Insulator Manufacturing Company, Victor, N. Y., announces the resignation of B. A. Plimpton as sales manager, effective Aug. 15. D. H. Osborne is serving as acting sales manager.

The National Carbon Company of Cleveland and San Francisco has recently increased the scope and efficiency of the Columbia data sheet service for users of motors and generators in regard to correct brushes for these machines.

The Stoker Manufacturers' Association announces the appointment of the following officers and executive committee at a meeting held recently at Lakewood, N. J.: Sanford Riley, president; M. Alpern, vice-president; A. C. Pratt, treasurer; S. A. Armstrong, H. A. Hatton, and J. G. Worker, secretary.

The Indiana Service Corporation, Fort Wayne, Ind., formerly called the Fort Wayne & Northern Indiana Traction Company, has placed an order with the Economy Electric Devices Company, Chicago, for Economy meters for a complete installation on the remainder of its interurban cars. The Fort Wayne-Decatur division has been equipped for about a year.

The Gate Coil Company, Boston, Mass., has acquired property and a factory on Willard Avenue, Providence, which is to be remodeled for the manufacture of electric coil-winding machinery. The company is a subsidiary of the Universal Winding Company, Providence, R. I., and is capitalized at \$100,000. Robert A. Leeson, 95 South Street, Boston, is president, and Frank N. French is treasurer.

The Blaw-Knox Company announces a change in the name of Hoboken, Pa., the home of the Blaw-Knox Company,

to Blawnox. The Blaw-Knox Company was first established in Hoboken, Pa., about five years ago, at the same time operating another plant at Wheatland, Pa. About two years ago the latter plant was removed and added to the Hoboken works, which has since been enlarged.

The American Jobbers' Supply Company, Woolworth Building, New York City, as the Eastern associated company of the Joslyn Manufacturing & Supply Company, Chicago, has taken over the exclusive sale in the East of the Lindsley Brothers Company, producer and distributor of Western red and Northern white cedar poles. R. D. Patterson, formerly Eastern representative of the Lindsley Brothers Company, is now associated with the American Jobbers' Supply Company.

The Roller-Smith Company, 233 Broadway, New York City, announces certain recent changes in its sales organization as follows: G. L. Crosby, previously sales manager, is now general sales manager at New York City; M. Frankel, previously assistant sales manager, is now Western sales manager at Chicago; W. J. Shire, previously a sales engineer, is now Eastern sales manager at New York City; C. G. Kahant, previously a sales engineer, is now export manager and district sales manager at New York City. F. R. Ryan, J. E. Wood and H. D. Baker remain district sales managers respectively of the Chicago, Cleveland and Detroit territories. In addition to the above C. M. Hunt is a sales engineer in the New York office, and M. B. Mathley is a sales engineer in the Chicago office.

### New Advertising Literature

Switching Apparatus.—The Union Switch & Signal Company, Swissdale, Pa., has issued bulletin 93, describing its style "M" electric switch movement.

Arc Welding.—The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., is distributing reprint No. 85, entitled "Analysis of Arc Welding Principles and Processes."

Wood Preserver.—The C-A-Wood Preserver Company, St. Louis, Mo., is getting out a series of letters, which will be continued, on the preservation of timber, poles, etc.

Ball Bearings.—The Fafnir Bearing Company, New Britain, Conn., has published booklet No. 20 covering its ball bearings for electrically driven and other machines.

Controllers.—The National Electric Controller Company, Chicago, is distributing price list No. 10, descriptive of National controllers, etc.

Condulets.—Crouse-Hinds Company, Syracuse, N. Y., is circulating bulletin No. 1000N, on "Condulets, Mogul Obround Series."

Machine-Tool Control.—The Cutler-Hammer Manufacturing Company, Milwaukee, Wis., has issued a forty-eight page book, entitled "Machine Tool Control—C-H Controller."