Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

Volume 55 New York, Saturday, April 10, 1920 *Number* 15

Need for Better Fire Brick Becoming More Pronounced

THE recent experiments with the use of pulverized coal for fuel in large generating stations has pointed clearly to the great need for ceramics research work looking toward the development of a fire brick which will provide a furnace lining capable of withstanding the very high temperatures that can be secured through this manner of combustion. Even with stoker operation, the furnace lining has been a source of great trouble for some years past, particularly in installations where it becomes desirable to force the boilers to about 250 per cent overload. It is highly desirable to be able to force boilers to several hundred per cent of their rating continuously, in some cases, and temporarily in nearly all cases, in connection with the electric railway and central station fields. The fire bricks available today, however, place a limitation upon the permissible furnace temperature. This limitation is more pronounced with pulverized fuel burning than it has been with stoker-fired boilers. In fact, it represents a limitation which mitigates against the best combustion efficiency. In other words, were it not for the limitation of the fire brick lining it would be possible to obtain almost perfect combustion with pulverized coal. This points to the great desirability of development work looking toward fire brick capable of withstanding much higher temperatures than can be permitted at present—a subject which might well be taken up by the fire brick manufacturers, the industrial research laboratories of the universities and other investigatory bureaus.

Are We Being Talked to Death?

GEORGE McMANUS is the author of "Bringing Up Father." Into his work he has packed a great deal of common sense. George pictures one of his characters in a barber shop. The man is being shaved. On his watch fob he has a bear's claw. The barber asks his patron how many shots it took to kill the bear. The patron answers that it didn't take any. The barber asks how many times the patron stabbed the bear. The patron answers none. Finally, the barber, bound that he will know how Bruin met his fate, asks how the patron did kill the bear. Then in desperation the patron replies, "I talked him to death."

Now, the United States is not exactly being talked to death, but it is being talked insensate. Nearly everybody is emulating Mr. McManus' barber. Industry seems to be divided—not equally by any means—into two general classes, those who work and those who pretend to work. They who pretend to work are the culture of courage crowd. Their middle name is Con, with a capital C. The former are too busy to believe in anything. The latter are too talkative to do anything. Their idea of emulating the boss is to convert themselves into a hot-air machine. They are the great pretenders. The human hot-air engine can be endured in politics, but he has no place in business. The sage of East Aurora made Rowan, his hero, the embodiment of action. The lesson of that little booklet had a salutary effect. Its circulation ran into many millions. It ought to be revived and a copy placed in the hand of every employee who has been led astray with the doctrine that appearing to be something you are not is the same as being that person. The culture of courage school will awaken to that fact sooner or later, but it might be well to accelerate the awakening. It would solve one of our national problems and remove a pest.

Don't Economize (?) by Cutting Down on Brain Power

IN GENERAL, superficially at least, the public appreciates brawn more highly than brain when it comes to public service. That is to say, it does so in comparison with the practice of the utilities and especially with that of the manufacturing and constructing companies. For example, a municipality expects to get technical service for a price very much lower than that paid privately for such services. The result is that, excepting under emergency circumstances which appeal to the public spirit of high-grade specialists among the citizens, only mediocre talent is available for public service.

One of the arguments, a specious one, in favor of public ownership and operation of utilities is that administration can thus be conducted more economically as far as the salary list is concerned. This short-sighted economy takes the form of low salaries and inadequate personnel. Mr. Hanson told the Toledo people a few weeks ago that one result of public ownership and management is that "low-priced managers put the business amounting to millions of dollars annually into the hands of wornout employees or young apprentices in electric railway operation." It is interesting to note that in Seattle recent economies on the municipal railway system take the form of the acceptance of resignations of three department heads and the abolishing of fourteen positions, thus saving $2,885 per month. In investigations of utility affairs generally the officials representing the public are usually much shocked by the magnitude of the salaries paid company officers by boards of directors who know that sometimes expensive things are cheapest. Yet these salaries are small measured by the ability of the recipients to save or lose vast sums for their employers.

This note is not an argument against public ownership and operations *per se*. It rather is a note of warning that the cutting down in the brain power of

any organization is killing the goose that lays the golden egg. As the Russian Soviet Government learned months ago, and, learning, profited thereby, brains must be had no matter how high they come. And they are coming mighty high in Russia today.

Oregon May Delay, but the Bill Must Be Paid Some Day

IN RATHER sharp contrast to the action of some other commissions, such as Maryland in the case of the Baltimore United Railways and Virginia in the case of the Norfolk City Gas Company, is the action of the Public Service Commission of Oregon in the Port and Railway case. In its opinion of March 23 it holds in suspense for at least two months more its decision on a fare increase which was requested last September. To be sure, the commission admits and proves that some relief must be given the company either by its riders in increased fares or by the public in taxes. But the delay in providing this opportunity to continue as a going concern is deadly.

We were about to add the Interstate Commerce Commission to the list of guilty on the same charge on account of its 120-day postponement of allowing the Hudson and Manhattan 8-cent fare relief requested, when the commission intimated that meanwhile it would allow relief according to an alternate fare scheme of 6 cents from New Jersey to lower New York and 10 cents to upper New York.

The reason Oregon delays its decision is that it would have the people of Portland vote on the commission's scheme of municipal ownership of track, thus transferring part of the fixed charges and maintenance costs of permanent way from the car rider to the general public. This, with the removal of street cleaning and other imposts, is its proposed measure of relief to the company.

There may be honest doubt and there should be careful study as to the best form of fare and other financial relations in each case, but to delay giving any relief at all, at the same time that the necessity for relief is acknowledged, is not fair to either company or public. Commissioner H. H. Corey, in dissenting from the majority opinion, argues forcefully on this point as well as against the ultimate measure of relief proposed.

The community eventually pays for what it gets and a mañana policy merely compounds interest, so that when the bill is eventually settled it is worse than it should be, and, too, it may be the next generation that will pay. While searching for the millennium, we ought to pay our own way.

What Has Norfolk Done?

"WHAT has Norfolk, Va., done out of the ordinary?" This query has been put in response to our article on page 682 of last week's issue, "Is not any community willing to assure capital a legitimate return when invested in public utilities?" The answer to this latter question may be, yes, but apparently Norfolk is the first city in the United States to take official corporate action in announcing a policy or platform assuring an inviting return and protection of capital. This act is a definite invitation to the public utility investor, and Norfolk believes that if this attitude toward public utilities is once appreciated, there will be an even greater attraction toward industrial development in such a community which indicates a real conception of business.

"Was not the whole question one of valuation?" Of course, the determination of the investment which is to be safeguarded presents difficult problems. In this connection, we would point out that the present situation in Norfolk is not one in which the city alone has made concession. It has been necessary for the company to approach the problem from the same standpoint as the city, namely, one of fair business dealings between willing parties of integrity on both sides. There will always be honest differences of opinion on the determination of what is the legitimate investment in any enterprise more than one day old. However, a determination on this question must be reached, and when the city and company get together, both with fair minds, both with the same fundamental conceptions as to justice to public and company, at least a basis of agreement ought to be determinable.

To see the extreme of the other side of this continuous question of dealing between cities and companies it is only necessary to turn to the local New York situation, where it is somewhat difficult, to say the least, to determine what the city's attitude is. If, on the other hand, the city would put itself on record as to a definite policy toward public utilities in a manner as fearless as Norfolk, it would at least be possible for both public and company to know where the city stood and to act accordingly.

That there are other examples toward both ends of the scale is not to be doubted, but we believe that the attitude of Norfolk will eventually prove the more advantageous to the community.

Unscrambling Grouped Properties Held Unsound

THE Pennsylvania Commission adheres to a sound policy of economic transportation in its argument on grouped properties in the Pittsburgh Railways case. There were some sixty-three complaints against some sixteen component parts of the operating property, but the commission groups these all into one case, for, it says, the primary consideration to the community as a whole is satisfactory transportation at the lowest cost consistent with sound financial and operating policy, and this can be accomplished only by maintaining the properties as one system. To allow the disintegration of the property into its various component parts, each with its separate fare and with service not articulating with other service, would be almost suicidal to the economic and social welfare of the Pittsburgh district.

To show its sincerity in this viewpoint, the commission proceeded to establish a basis of financial stability for the company so that it would be possible for it to realize the commission's desire of one system. To prove the present fare not excessive, and this was the point at issue in most complaints, the commission said all it needed was the lowest valuation figure offered by any complaint, namely, $48,000,000. But to stop there and say that the property as a whole is worth not less than $48,000,000 would put the company in so vulnerable a position financially that it could not secure necessary funds and would be liable to ultimate disintegration by a series of foreclosures. This would defeat the very purpose of the commission as stated above, namely, to keep the property together. So the commission, although finding it unnecessary for the purpose of the rate case, made a determination of value for the sole purpose of stabilizing the company's financial

status that it might continue as one property, finding the value to be $62,500,000, compared with the company's claim of $70,000,000 and the approximate capitalization of $156,000,000. This, the commission says, tells the company where it stands and allows it to proceed with a constructive program of refinancing and of improving service.

It appears to us that the commission has done a piece of work in line with its constructive policy which we have commended heretofore in these columns.

On one point, however, we wish the commission had been more definite, and that is in its treatment of depreciation and some other details of valuation. As to its subtraction for theoretical depreciation as measured by the physical condition or remaining life of property, the commission does not argue at length, but says it doesn't feel justified in changing its past record and policy. Nor does it say how much it subtracts. If the commission had restated its definite reason for the subtraction and given the amount, even approximately, subtracted for depreciation, it would have faced this issue as squarely as it has the other issues of the situation. We do not criticise the total figure arrived at; it may be perfectly fair. Valuations are hard to determine to any one's entire satisfaction, but it seems entirely probable that more definiteness on the part of commissions as to the exact treatment accorded various items would hasten the day of more nearly complete agreement on valuation methods.

Give the Security Holders Full Information Regarding Operation

THE form of annual report issued by most electric railway companies leaves much to be desired. Usually a condensed balance sheet with brief income statement, in which all operating expenses are grouped in one item, is all that is published. Where the securities of a company are closely held and the company is a small one there is perhaps no reason for the publication of any annual report, because the security holder can get detailed figures of the company's operation by direct application to the company or from its report filed with the Public Service Commission. With a larger company, which prints its reports for circulation among its stockholders, there is every reason why the essential data should appear in its report.

Annual reports, we believe, should contain, first, an income statement setting forth the revenue details and deductions, so as to show the surplus or deficit carried to the balance sheet, with comparative figures for the previous year. The operating expenses should be separated at least into the primary accounts. In the balance sheet the more important assets and liabilities should be detailed and the changes from the preceding year should be shown.

Should the company consider itself in a position to publish a larger report, further interesting information would be data as to the track mileage owned and operated, the different kinds of traffic handled, the number of cars, car-miles and car-hours run, kinds of rolling stock owned, basis of fare schedules and average length of ride and maximum ride possible for the minimum fare. A map is also desirable. If a still larger report is possible there are many ways in which it can be expanded. In fact, we know of one electric railway company which goes so far as to keep a memorandum of a request for information that does not appear on its latest report as a guide to what may be included in the next edition.

Electric railway companies, we believe, have failed to comprehend the advantages that accrue from such publicity. If the report is a favorable one publication of the figures mentioned will increase the company's credit. If the year's operation has been unfavorable the sooner the public knows the facts the better. If there are any persons from whom the company wishes to conceal any facts in regard to its operation they can get the figures, if they desire to do so, at the office of the State Public Service Commission. Hence, the company has nothing to lose and everything to gain by making these figures easily accessible to the general public.

Has Automatic Substation Control Made Good?

INTEREST in the automatic substation would be justified if for no other reason than that it is a real indication of technical progress which promises economy. The electric railway or any other business is stimulating only to the extent that developments are taking place and an improved future service is visualized. The automatic substation is therefore worth while because it meets both of these specifications.

But the automatic substation is more than a promise, more than a harbinger. It has made good—on a small scale to be sure, but on a scale as large as could be expected in six years, half of which were war years. Moreover, the automatic control principle has been found applicable in a field much broader than was originally contemplated.

The automatic control installation most widely heralded, after the pioneer equipments installed on B. J. Arnold's interurban road, was the one in Des Moines, Iowa. Circumstances were propitious there to a remarkable degree for this innovation and the electrical engineer of the local railway property, F. C. Chambers, had the foresight and the courage of his convictions necessary to put the thing over. Back of him was the reputation of a great manufacturing company, staked to the extent to which it was involved in automatic control for electric railways, upon making the proposition a success.

Believing that the time is now fitting for a review of the Des Moines situation, and knowing that its readers want to know, first hand, what has been going on in Des Moines during the four years since the present plan was put into operation, the ELECTRIC RAILWAY JOURNAL asked Mr. Chambers to go over the whole story briefly, stating just what automatic control has done for Des Moines railway service and how it has done it. The response is an article printed this week. Mr. Chambers may later supplement this with more operating detail, and if any questions arise in the minds of the readers of the paper which he does not answer now these might be sent to him or to the JOURNAL so that they can be answered later.

If the automatic substation was desirable before the war it is doubly so now. Attendance costs more than it did; attendants on the average are less efficient, so that it is desirable to turn over all possible operation to automatic apparatus; the equipment has been considerably improved through experience; the limitations and proper fields for automatic control have been discovered, and confidence in the ability of the devices to function properly has been established.

Automatic Substations at Des Moines

Installation of First Two Units Averted Need of New Feeder Cable and Permitted Salvage of Existing Cable—Seven Automatic Stations on City System Installed at Saving of $120,000 in Investment—Equipped with Selector Control

By F. C. CHAMBERS
Mechanical and Electrical Engineer Des Moines City Railway

THE Des Moines City Railway operates 90.43 miles of line, measured on a single-track basis. In the accompanying illustrations are shown the lines composing the system, together with a small portion of the property of the Inter-Urban Railway, which is owned and operated by the same interests but as a separate corporation. The corporate limits of the city of Des Moines include a total of 54 square miles, 9 miles east and west and 6 miles north and south. The lines of the railway company extend outside of the city limits in several directions. The total length outside the corporate limits is 5.2 miles. The business section of the city is somewhat lower than the residence section, so that all cars outward bound from the business section encounter upgrades, the maximum value of these on the different lines varying from 0.5 per cent to 7.6 per cent.

The railway company owns a total of 150 passenger cars, the weights and motor capacities of which are recorded in Table I. A total of 104 cars are operated during the rush hours and during this period as many of the large cars are kept in operation as is possible consistent with carrying out the necessary inspection and repair work on the equipment. The average schedule speed on the entire system is 9.3 m.p.h.

TABLE I—CAR EQUIPMENT DES MOINES CITY RAILWAY

Number of Cars	Weight	Horsepower of Motors
40	31,800 lb.	92
9	35,000 lb.	92
6	42,000 lb.	140
30	41,000 lb.	100
45	36,000 lb.	100
20	36,000 lb.	75
Total, 150	5,409,000 lb.	14,348

Average weight of cars, 36,060 lb.
Average horsepower of motors, per car, 95.6.

For several years previous to Nov. 22, 1915, the company had been operating without a franchise. For this reason it was impossible to secure the necessary capital for extensions and improvements which should have been made in order to keep up with the growth of traffic, which was steadily increasing each year due to the development of the city. The result was that when a new franchise was granted the company in November, 1915, not only was the physical condition of the property as a whole in bad shape, but the amount of traffic which was being handled taxed the car equipment, power generating equipment and distributing system to the limit. The new franchise grant carried with it provisions which not only necessitated the rebuilding of several of the lines, but also the extension of certain lines, the building of a new line 2.2 miles in length and the addition of at least forty cars.

The generating equipment of the power station at that time consisted of one 1,000-kw., 2,300-volt, three-phase, 25-cycle turbo-generator; one 2,000-kw., 2,300-volt, three-phase, 25-cycle mixed-pressure turbo-generator, and two 1,000-kw., direct-current engine-driven generators. Approximately 80 per cent of the power for the system was supplied by the direct-current generators at the power station, the balance being supplied from the substations indicated in Fig. 1 as substations No. 1 and No. 2. These were supplied with three-phase, 25-cycle current at a potential of 23,000 volts from the generating station. The substation No. 2 was owned and operated by the Des Moines City Railway and in addition to supplying power for part of the city system it also supplied direct current to the south end of the Beaver Valley Division and the west end of the Flint Valley Division of the Inter-Urban Railway system. The substation No. 1 was owned by the Inter-Urban Railway and in addition to supplying power to the east end of the Flint Valley Division and the west end of the Colfax Division of the Inter-Urban system it also supplied power to the lines in the eastern part of the city.

Fig. 1 also shows the feeders leading from the power station and the two substations to the various lines, the trolley system and the return feeder system as it existed at that time, amounting to over 650,000 lb. of copper and representing an investment of $162,500, figuring the copper on an average of 25 cents per pound.

GENERATING STATION 25 PER CENT OVERLOADED—DISTRIBUTION LOSS ALSO 25 PER CENT

With the generating station carrying an overload of 25 per cent each morning and evening, the instantaneous loads reached a point which reduced the speed of the engines and turbines. The loss in the distributing system amounted to 25 per cent. It was therefore evident that in order to provide an ample supply of power for the system not only would it be necessary to increase the capacity of the generating station, but also to provide additional capacity in the feeder system. This was necessary in order to reduce the excessive line loss and to take care of the increased power demands resulting from the addition of more cars to the system, and from the speeding up of cars which would be possible providing the line potential was maintained at a fairly good value. The average schedule speed at that time was 8 m.p.h.

The problem of selecting the proper equipment for increasing the capacity of the generating station was comparatively simple. It would not have been economical from the standpoint of either first cost or operation to add additional direct-current generating capacity to the power station, as the territory covered by the lines was so great that it would have required a very heavy investment in feeder copper to distribute the additional power, with the attendant loss in the feeder. In addition to this phase of the situation, the demand of the Inter-Urban Railway for power to operate its trains and also

for commercial power was constantly increasing and for these reasons a 5,000-kw. turbine unit was installed.

In order to take advantage of the lower water rate of the 5,000-kw. turbine as compared with the other units, it was planned to install two 2,000-kw. rotary converters in the power station. In this way the entire load of both the Inter-Urban and city systems could be carried by the 5,000-kw. unit except during peak loads, the direct-current generators being operated only in case the 5,000-kw. unit was out of service. The plan for installing the two 2,000-kw. rotary converters was, however, abandoned as will be explained later on.

converter and to install additional feeder cables from this substation and the power station to the various lines. The investment necessary to increase the capacity of the substation and to cover installation of additional feeders from this station and the power station, together with the installation of two 2,000-kw. rotary converters at the power station as referred to above, amounted to $232,300. Over 40 per cent of this represented the cost of additional feeder cables. Fig. 2 shows the proposed overhead system with the additional feeder cables leading from the Beaver Valley substation and the power station. In Fig. 2 are also shown the

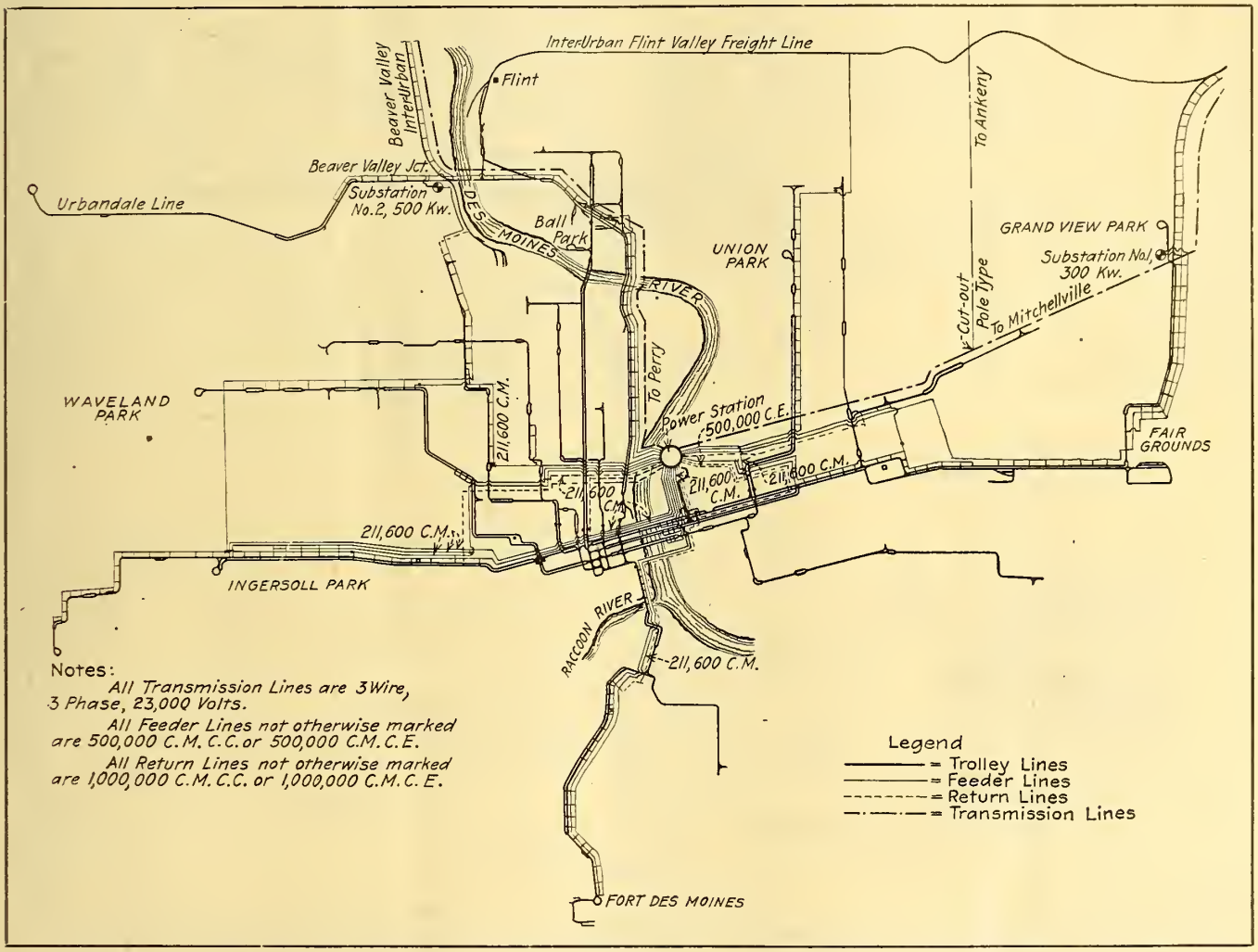


FIG. 1—TROLLEY, FEEDER AND RETURN SYSTEM OF DES MOINES CITY RAILWAY ON NOVEMBER, 1915, SHOWING ALSO THE LOCATION OF SUBSTATION NO. 1 AND SUBSTATION NO. 2. TOTAL AMOUNT OF COPPER, 650,000 LB.

The next problem was to provide an adequate distributing system. Despite the fact that there was 650,000 lb. of copper in the overhead system, representing an investment of $162,500 in copper alone, the loss in transmission was approximately 25 per cent. This represented an annual loss of $50,000. In addition to this loss in power an equal if not greater loss was being sustained due to the low schedule speeds resulting from an insufficient amount of feeder cable to maintain a good operating potential on the lines.

The first plan suggested to bring the line loss down to a point which would be considered good engineering and to provide an operating voltage which would permit of increasing the schedule speed of the cars was to increase the capacity of substation No. 1 at Beaver Valley Junction by the addition of a 1,000-kw. rotary

proposed negative feeders leading from the various lines back to the substation and power station. The total amount of copper in the system including these feeders would be 1,050,000 lb., requiring an investment of $262,500.

In order to reduce the investment in feeder cables, a second plan was considered. This contemplated the installation of two additional substations and reduced the total investment required for feeders, but when the wages of six operators, three for each substation, were capitalized, the first plan proved to be more economical.

It was evident that the second plan, with the greatly reduced amount of feeder cables and the additional substations, would be advantageous both from the standpoint of investment and of economy of operation providing the cost of attendance could be eliminated. About

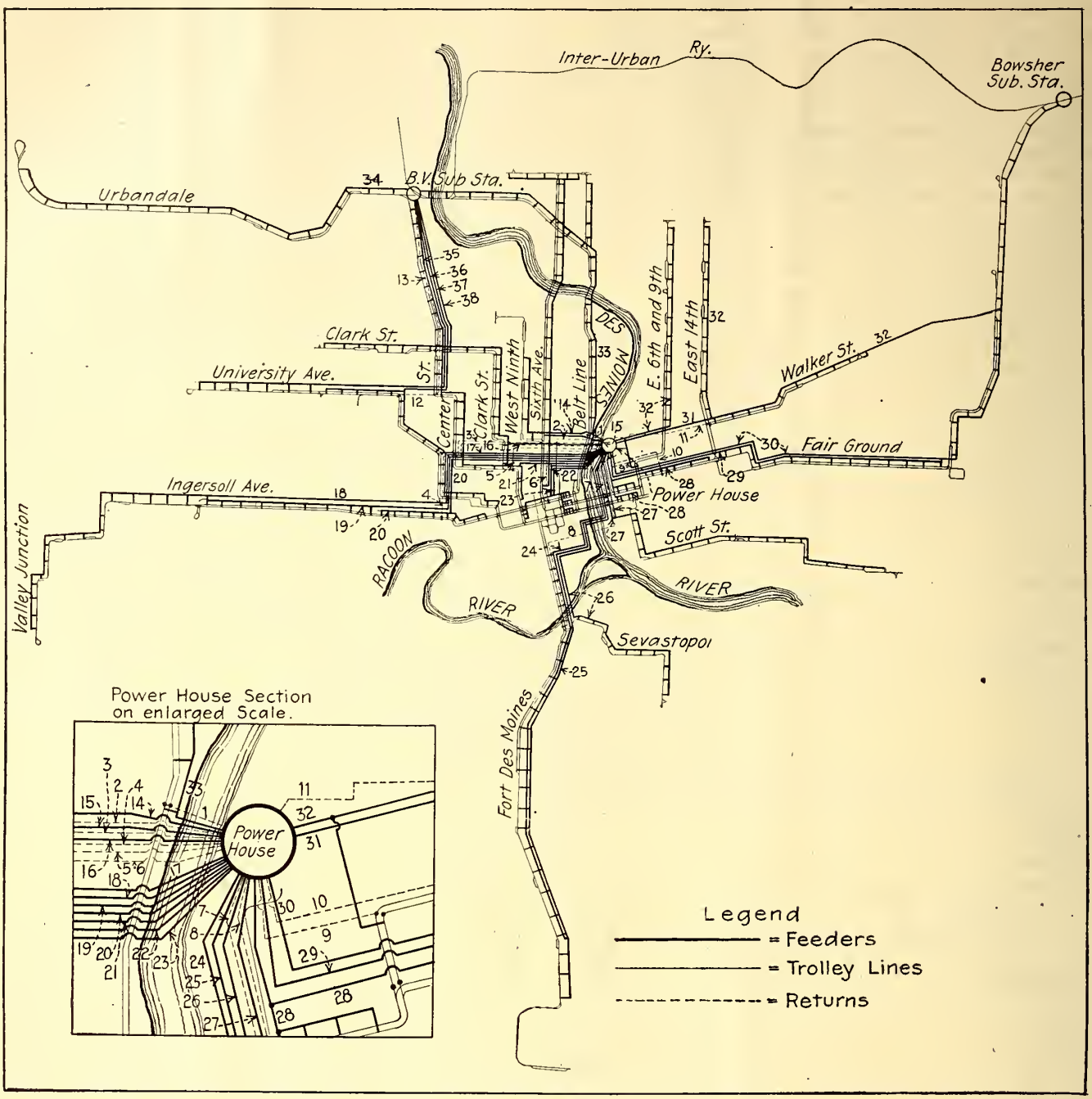


FIG. 2—PROPOSED FEEDER AND NEGATIVE RETURN SYSTEM, SHOWING ADDITIONAL FEEDERS WHICH WOULD HAVE BEEN NECESSARY TO BRING LINE LOSS DOWN AND PROVIDE SUFFICIENT OPERATING VOLTAGE UNDER FIRST PLAN OF INCREASING CAPACITY OF BEAVER VALLEY STATION. TOTAL AMOUNT OF COPPER, 1,050,000 LB.

KEY TO NUMBERS IN FIG. 2

1. Insulated return to power house from Belt line, 500,000 circ.mil insulated wire.
2. Insulated return to power house from Sixth Avenue line, 300,000 circ.mil insulated.
3. Insulated return to power house from University line, 1,000,000 circ.mil insulated.
4. Insulated return to power house from Ingersoll line, 2,000,000 circ.mil insulated.
5. Insulated return to power house from Clark Street line, 500,000 circ.mil insulated.
6. Insulated return to power house from West Side loop, 750,000 circ.mil insulated.
7. Insulated return to power house from East Side loop, 1,000,000 circ.mil insulated.
8. Insulated return to power house from Fort Des Moines line, 1,000,000 circ.mil insulated.
9. Insulated return to power house from East Sixth and Ninth line, 300,000 circ.mil insulated.
10. Insulated return to power house from Capital and East Grand Division, 500,000 circ.mil insulated.
11. Insulated return to power house from East Fourteenth line, 400,000 circ.mil insulated.
12. Insulated return to Center Street line from University line, 500,000 circ.mil insulated.
13. Insulated return to Bowsher Valley substation from Center Street line, 600,000 circ.mil insulated.
14. Feeder from power house to West Ninth line, No. 0000 insulated wire.
15. Feeder from power house to Sixth Avenue line, No. 0000 insulated.
16. Feeder from power house to Clark Street line, 300,000 circ.mil insulated and No. 0000 insulated.
17. Feeder from power house to University line, 850,000 circ.mil insulated, and No. 0000 insulated.
18. Feeder from power house to Valley Junction line, 500,000 circ.mil insulated.
19. Feeder from power house to Ingersoll line, 1,000,000 circ.mil insulated and 800,000 circ.mil insulated.
20. Feeder from power house to Ingersoll line, 800,000 circ.mil insulated and No. 0000 insulated.
21. Connecting feeder power house to Center Street feeder, 250,000 circ.mil insulated.
22. Feeder from power house to West Side loop, 800,000 circ.mil insulated.
23. Feeder from power house to West Side loop, 800,000 circ.mil insulated.
24. Feeder from power house to Ft. Dodge-Des Moines line, 500,000 circ.mil insulated.
25. Feeder from power house to Ft. Dodge-Des Moines line, 500,000 circ.mil insulated.
26. Feeder from power house to Sevastopol line, No. 00 insulated.
27. Feeder from power house to Scott Street line, No. 00 insulated.
28. Feeder from power house to East Side loop, No. 0000 insulated.
29. Feeder from power house to Fair Ground line, 1,000,000 insulated.
30. Feeder from power house to Douglas Avenue line and into Bowsher Valley substation, 500,000 circ.mil insulated.
31. Feeder from power house to Walker and East Fourteenth Street lines, connecting with Douglas Avenue feeder, 350,000 circ.mil No. 0000 and No. 00 insulated.
32. Feeder from power house to East Sixth and Ninth line, 500,000 circ.mil insulated and No. 0000 insulated.
33. Feeder from power house to Belt line and into Bowsher Valley substation, 500,000 circ.mil insulated.
34. Feeder from Bowsher Valley substation to Urbandale line, 500,000 circ.mil insulated and No. 0000 insulated.
35. Feeder from Bowsher Valley to Center Street line, No. 0000 and No. 00 insulated.
36. Feeder from Bowsher Valley to Waveland Park line, 500,000 circ.mil insulated.
37. Connecting feeder from Bowsher Valley substation to University feeder, 800,000 circ.mil insulated.
38. Connecting feeder from Bowsher Valley substation to Clark Street feeder, 350,000 circ.mil insulated.

one year previous to this time the General Electric Company had brought out and placed in service elsewhere three automatic control equipments for rotary converter substations. An investigation of the reliability of operation of the automatic equipments was made and the result of this investigation was such that it was decided to purchase two substation equipments with automatic control. After the equipment for these two substations had been purchased, a complete survey of the traffic conditions on the lines was made and estimates of the probable increase in traffic over a period of five years were prepared. From this information the power which would be required for the different sections of the system during this period was estimated.

These figures disclosed the fact that by the installation of additional substations not only could the expense of providing additional feeder cables be eliminated, but also the greater part of the existing feeder cables of the system could be taken down and disposed of for approximately $90,000. Five additional automatically controlled equipments were purchased during the following year, and the substations were so located at different points on the system that the greatest number of the different sections could be reached with the least amount of feeder cables. Part of these equipments were delayed in delivery due to congestion in the manufacturer's plant, which was also engaged in the manufacture of apparatus for the United States government. Due also to delays in the completion of substation buildings resulting from a strike of the building trades, the last one of these equipments was not put into service until April 1, 1919.

Fig. 3 shows the location of the new substations and also of the Beaver Valley and Bowsher substations

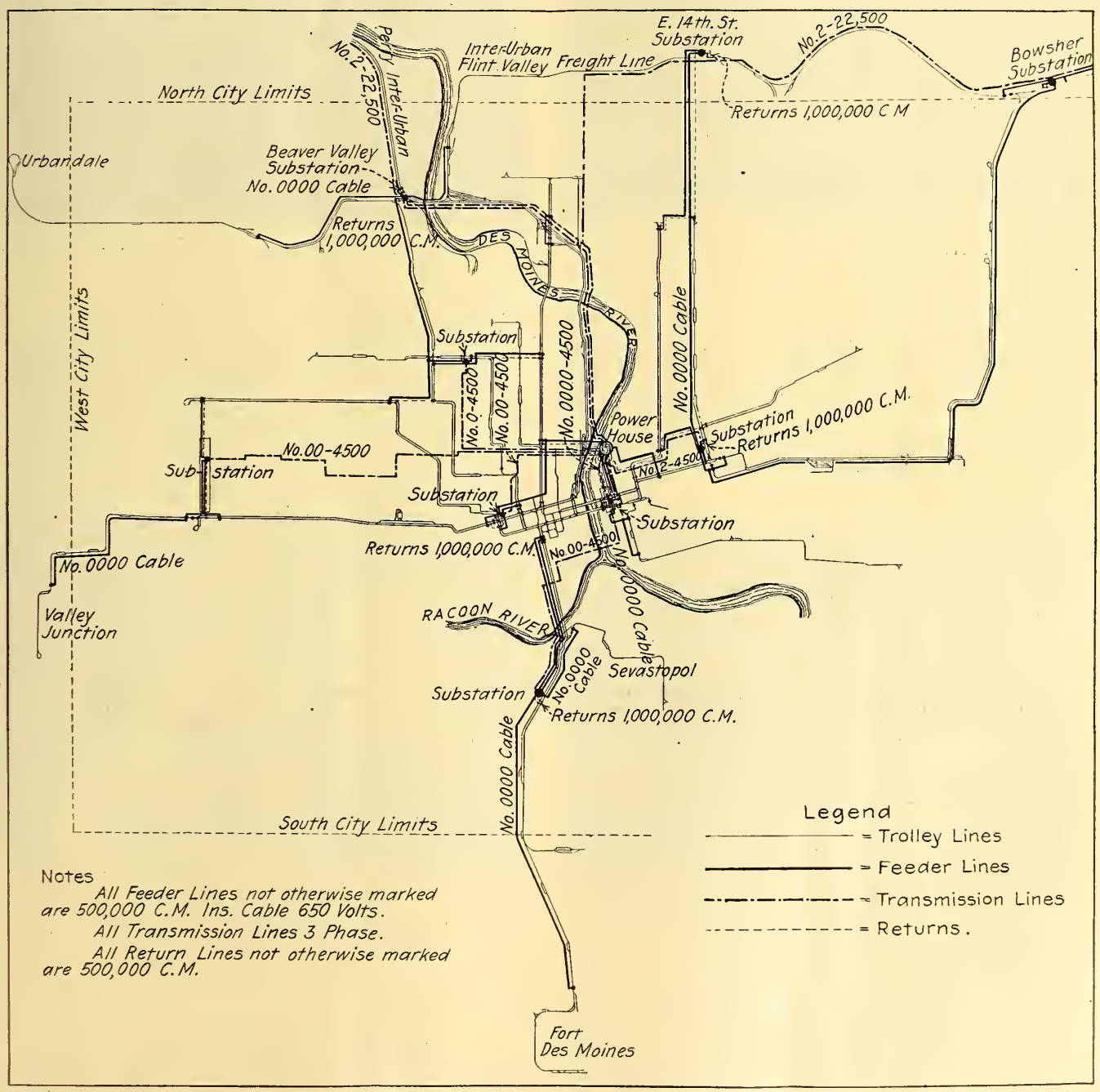


FIG. 3—OVERHEAD SYSTEM SHOWING FEEDER AND RETURN SYSTEMS AS ACTUALLY INSTALLED AND NOW IN OPERATION WITH SEVEN AUTOMATIC SUBSTATIONS. TOTAL AMOUNT OF COPPER, 460,000 LB. PRESENT TRANSMISSION LINE SYSTEM IS ALSO INDICATED

referred to above. The sections into which the trolley system is divided and the feeders leading from the substations and the power station to the different sections of the trolley system are also indicated. It will be noted that one of the stations is installed on the Flint Valley Division of the Inter-Urban system and furnishes power for both this division of the Inter-Urban line and the lines in the northern part of the city. In Fig. 3 also is shown the trolley system, location of substations and the return feeders leading from the track system to the substations and power station and the transmission lines. The total amount of copper in the system at present is 460,000 lb.

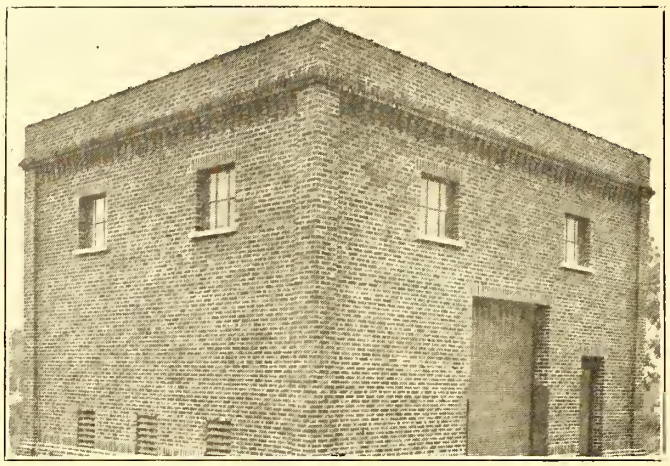


FIG. 4. EXTERIOR OF DES MOINES SINGLE-UNIT AUTOMATIC SUBSTATION

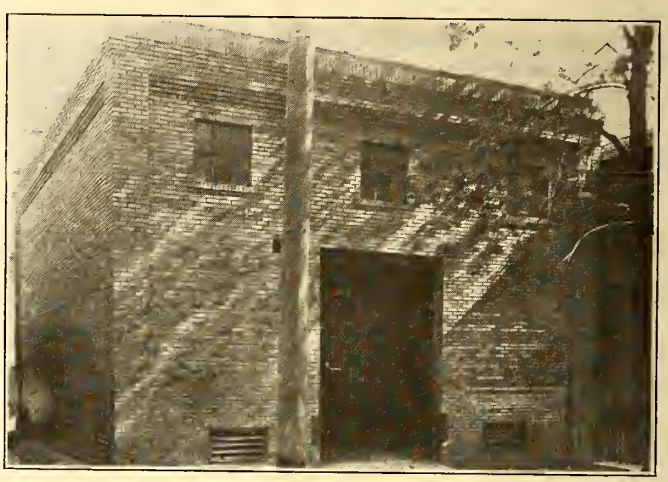


FIG. 5. EXTERIOR VIEW OF DOUBLE-UNIT AUTOMATIC STATION

Table II shows the comparative investment required for the two systems designated as A and B. System A includes the installation of rotary converters at the power station and Beaver Valley substation and additional feeders from both of these stations. System B comprises the installation of the automatic substations with transmission lines and the removal of a part of the feeder cables. The item in Table II under system B, covering equipment for changing station voltage from 2,250 to 4,500 volts and amounting to $13,322, was necessary due to the fact that with 2,250 volts the investment in copper in the transmission lines would have been enough greater to more than offset the cost of equipment for changing the station voltage.

TABLE II.—COMPARISON OF COST OF TWO PROPOSED SYSTEMS TO INCREASE POWER SUPPLY AND PROVIDE ADDITIONAL FEEDER CAPACITY

	System A	System B
Power station buildings	$15,000	$5,000
Transformers, rotary converters and automatic control equipment, including miscellaneous material and installation	.....	130,165
Transformers, rotary converters, switching equipment, including miscellaneous material and installation	76,300	.....
Substation buildings	4,000	23,200
Transmission lines	12,000	58,183
Trolley and feeder system (copper only)	262,500	28,961
Rebuilding feeder lines	25,000	.....
Switching equipment for transmission lines	.....	15,901
Equipment, miscellaneous material for changing station voltage from 2,250 to 4,500 volts	.....	13,322
Total	$394,800	$274,732

In giving the comparative cost of the trolley and feeder system of systems A and B, the cost of pole lines, etc., has not been included, as in either case this cost would be practically the same. As the object of tabulating the costs as given in this table is to show the difference in cost of the two systems, the cost of pole lines, etc., for trolley and feeder system was omitted.

The difference in the cost of systems A and B, amounting to $120,068, is approximately $20,000 less than the difference in the cost of the two systems as estimated at the time the first two equipments were bought in 1916. This is due to the increase in cost of the equipments purchased subsequent to that date and the increase in cost of building, miscellaneous material and labor. If the seven equipments had been purchased and installed under 1916 conditions and prices, the difference in the cost of the two systems would have exceeded the original estimate of saving in the initial investment of $140,000 by at least 10 per cent.

Five of the seven automatic stations are of the single-unit type, each having a 500-kw. rotary converter, and two are designed for two units, each of 500-kw. capacity, although at the present time only one unit has been installed in each of these two stations. These stations are located at Twelfth and High Streets and East Second and Walnut Streets, which are the east and west limits of what is known as the union loop, comprising all of the tracks in the main business section of Des Moines. All cars of the system enter this loop on each round trip. As the system is extended and additional power is required the second unit will be added to each of these stations.

At the present time, in order to prevent these two stations from being too heavily overloaded during peak loads, and also to bring up the load factor on the stations in the outlying districts, the potential of the latter stations is maintained from 20 to 50 volts higher than it is at the Twelfth and High Streets and East Second and Walnut Streets stations. This difference in voltage equalizes the load between the stations. When the load has reached a point which requires the installation of the second unit in each of these two stations the voltage at all stations will be adjusted to the same value, as there will be no further necessity of guarding against excessive overloads. Due to the increased load in general on the system, all stations will then have a fairly good load factor.

Five Single and Two Double-Unit Stations of Similar Design and Equipment

Fig. 4 shows the exterior of one of the single-unit stations and Fig. 5 is a view of one of the stations designed for two units. These buildings, which are lo-

TABLE III—TABULATION OF RESULTS OF OPERATION OF SUBSTATIONS OVER PERIOD OF THIRTY DAYS

Station	Kw.-Hr. to Transmission Line	Kw.-Hr. Input Substations	Kw.-Hr. Output Substations	Hours Operated	Load Factor	Transmission Loss	Conversion Loss	Total Loss
Twelfth and High	119,320	115,400	104,280	261	79.91	3.29	9.70	12.66
East Second and Walnut	175,760	172,100	158,680	335	94.74	2.07	7.80	9.72
Fort Des Moines	288,880	277,000	253,180	572	88.52	4.11	8.60	12.36
East Fourteenth and Des Moines	233,140	225,200	200,880	567	70.86	3.40	10.80	13.83
Sixteenth and Clark	256,950	247,700	222,930	564	79.06	3.60	10.00	13.24
Polk Boulevard	168,270	161,900	141,660	576	49.19	3.78	12.50	15.81
Totals	1,242,320	1,199,300	1,081,610	2,875	75.25	3.46	9.81	12.94

cated in the residential sections of the city and face on streets, are constructed of face brick having struck joints. Buildings located between streets and facing on alleys are constructed of common brick, the brick in all stations being laid in cement mortar. The single unit stations are 25 ft. x 30 ft. over all with 13-in. walls and 20 ft. between the floor and underside of the concrete trusses which form a part of the roof. Each of these stations is provided with an 8-ft. x 12-ft. Kinnear rolling steel door and a 2-ft. 8-in. x 6-ft. 8-in. steel swinging door. On three sides of the building and located 14 ft. 9 in. from the floor are two 3-ft. 3-in. x 3-ft. 3-in. stationary steel sash windows of six panes each.

The double-unit type of station is 25 ft. x 40 ft. over all with the same thickness of walls and same height as the building for single units. These stations are provided with an 8-ft. x 12-ft. Kinnear rolling steel door in each end and one 2-ft. 8-in. x 6-ft. 8-in. swinging steel door. The size, location and number of windows in these stations is the same as in the single-unit stations. Ventilation for all stations is provided for by the installation of louvers at the floor line and glass top ventilators on the roof. The single unit stations have seven 2-ft. 3-in. x 2-ft. 6-in. louvers and one 3-ft. ventilator, while the two unit stations are provided with twelve 2-ft. 3-in. x 2-ft. 6-in. louvers and two 3-ft. ventilators. Figs. 6 and 7 show the interior of one of the single-unit stations.

Five of the automatic stations are supplied over aerial lines from the generating station, with three-phase, 25-cycle current at a potential of 4,500 volts, these lines entering the stations through roof bushings. One station is located in the "underground district" and the lines for this station are carried in a conduit line constructed of 3-in. fiber duct. The station which is located on the Flint Valley Division of the Inter-Urban system is supplied with current from the three-phase, 25-cycle, 22,500-volt transmission lines, which also supply current to other substations and commercial power installations along this line.

The direct-current feeders from all substations are carried underground through either iron or fiber conduit to poles located along the lines adjacent to the substations and terminate in a pothead. Lightning arresters are installed on all direct-current feeders in the substations and at the point where the cables leave the potheads. The automatic control equipment of the stations is what might be called the standard type of control as manufactured by the General Electric Company for operating this type of equipment, and as the control has been fully described in previous issues of the ELECTRIC RAILWAY JOURNAL no further description of the control equipment and the operation of same will be given at this time.

On a system equipped with automatically controlled substations when an overload or short circuit occurs on one of the trolley sections the feeder or feeders from one or more substations supplying current to this section are not disconnected from the direct-current bus at the substation by the tripping of an automatic circuit breaker, but instead a resistance of sufficient value to limit the current to a pre-determined value is inserted in series with these feeders by the opening of the line contactors. These under normal conditions form a short circuit around the resistance.

Under certain conditions, such for instance as quite an extensive break in the trolley system in congested districts or due to conflagration of a serious nature adjacent to the trolley lines, it is desirable to have some means for shutting off the current entirely from these sections without interrupting the supply of power to the other sections. Of course this could be accomplished by calling out the trouble car and having the disconnecting switches in the feeders leading to this section opened, but as some sections are supplied with current from three different substations this would require con-

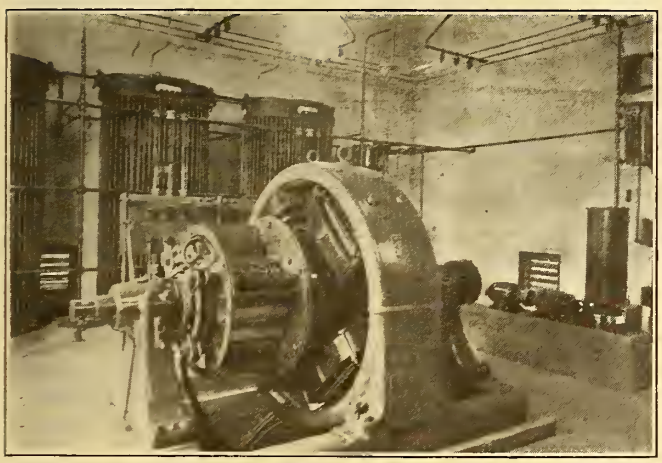


FIG. 6. INTERIOR OF SINGLE-UNIT AUTOMATIC SUBSTATION AT DES MOINES, SHOWING 500-KW. CONVERTER AND MOTOR-OPERATED CONTROLLER

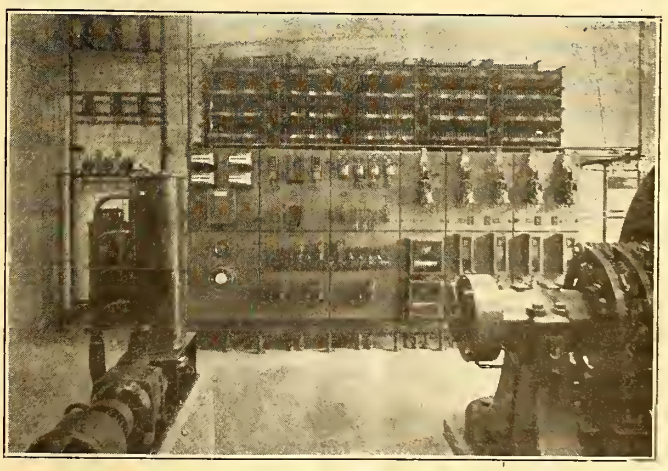


FIG. 7. SINGLE-UNIT AUTOMATIC SUBSTATION, SHOWING MOTOR-OPERATED DRUM CONTROLLER, CONTROL PANELS AND RESISTANCE

siderable time and no doubt in some cases the object of killing the line would be defeated before these switches could be opened.

To provide for emergencies of this sort and to be able to disconnect any section at any time, whether it is supplied with power from one or more substations, without delay or interruption to the supply of power to other sections, the feeders leading from each substation are connected to the bus through solenoid operated circuit breakers. These breakers are operated by means of relays located at the substations and by potential wires leading from all substations to a key board located at the power station. This is either opened or closed by the switchboard operator and any number of breakers in the feeders for a given section, whether located in one or more substations, may be operated simultaneously by turning the master key for these particular breakers in the key board located at the power station. With this equipment, the disconnecting or connecting of any section of trolley in the system, whether it is fed by one or more substations, is at all times under the control of the switchboard operator.

Table III shows the kilowatt-hours delivered to the transmission lines, the kilowatt-hours input at substations, the kilowatt-hours output at substations, the number of hours that stations were in operation, the load factor, the transmission loss, the conversion loss and the total loss over a thirty-day period.

TABLE IV—EXISTING OPERATING CONDITIONS DURING SAME THIRTY-DAY PERIOD AS TABULATED IN TABLE III.

Average peak load, kilowatts	3,234
Kilowatt capacity of rotary converters operated	3,000
Load factor (per cent)	108
Total weight of cars operated (tons)	1,826
Total horsepower of car motors	9,703
Kilowatt capacity of rotary converters operated per ton weight of cars	1.64
Kilowatt capacity of rotary converters operated per horsepower capacity of motors	0.309

Table IV shows for this period the average of the one-hour morning or evening peak load, the kilowatt capacity in rotary converters in operation, the total weight of cars (tons), the total horsepower rating of car equipment motors in operation, the ratio of capacity of rotary converters in operation to weight of equipment in operation (tons) and the ratio of capacity of rotary converters in operation to the horsepower rating of motors in operation.

The equipment of the automatic stations is inspected every two weeks. This inspection consists of a thorough examination and cleaning of all apparatus, beginning with the lightning arresters on the alternating current lines as they enter the station and following through to the terminals of the direct-current feeders. During this inspection the contacts of all relays and contactors are inspected and cleaned and if burned they are either filed or put back in good condition by the use of sand paper or emery cloth. The height of oil in the oil wells of the bearings of the rotary converters and the motor operating the control equipment is examined and also the condition of the oil rings. That is, the inspector observes the rings while the apparatus is in operation to see if oil is being fed to the bearings properly. The brushes on the alternating current and direct-current ends of the rotary converter and the brushes on the control motor are removed from the holders and the brushes and holders thoroughly cleaned and all dirt and deposit removed from commutators and collector rings. All relays having time elements are tested for time setting and also to determine if the contactors or switches in connection with which they are used function properly.

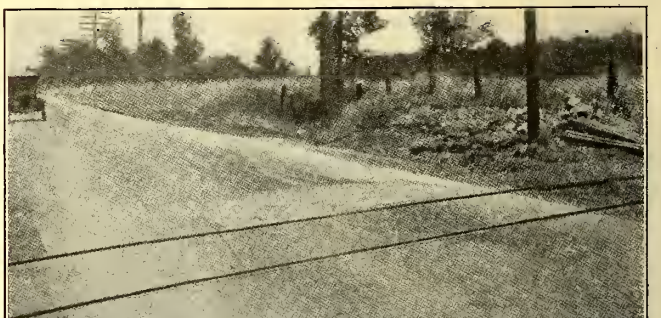
After the inspection has been completed and the apparatus is thoroughly cleaned, the station is put into operation and the operation of the control apparatus during the starting is carefully observed to make certain that all of the apparatus is left in a first-class operating condition. No additional attention is given these stations until the next regular inspection with the exception that the charging of the aluminum-cell lightning arresters is done each day during warm weather and every second day during cold weather by one of the helpers who assists in making the inspection and cleaning of the stations.

The operation and maintenance of these stations together with six similar stations and five manually operated stations on the Inter-Urban system come under the supervision of D. H. Nail. The inspection and cleaning of the automatic stations requires an average of three hours, not including the time required in going to and from the stations. One electrician and two helpers make all inspections and maintain the twelve automatic stations and also take care of the maintenance work on the five manually operated stations.

Concrete Highway Crossings for Safety

AN ARTICLE in the March issue of the *Concrete Highway Magazine* describes the use of concrete highway crossings in Wayne County, Michigan.

Three types of concrete crossing have been used. In the first, the grade is excavated 1 ft. below the bottom of the tie and is filled with concrete. Concrete is also placed between and over the ties to a level with the top of the rails, flangeways being formed in the concrete inside the railhead. In a second type the flangeway is provided by specially cut granite blocks along the inner side of the rail. This is a little more expensive than the first, but is said to have proved satisfactory.



CONCRETE HIGHWAY CROSSING AS BUILT IN MICHIGAN

A third type of crossing is built with pre-moulded concrete slabs, approximately 2 ft. x 6 ft., with a thickness equal to the depth of the rail. These slabs are cast and hardened in a construction yard and then laid like an ordinary plank crossing. An advantage in this type of construction is that the slabs can be removed, the tracks reballasted and the crossing replaced without injury to the slabs.

These concrete crossings have been constructed by the county road forces at the expense of the railroad companies and at crossings where the remainder of the highway is of concrete construction.

Future of the Electric Railway*

The Electric Railway Industry Has Suffered Greatly from Increased Costs of Operation, but Conditions Are Gradually Righting Themselves Through Fare Raises—Essential Nature of the Industry Proved—Better Labor Conditions Follow the Strike in Kansas City—Bright Future Predicted

BY PHILIP J. KEALY
President the Kansas City Railways Company

THE future of the urban electric traction is, in my opinion, based upon the generally accepted premise that urban transportation is essential, since every phase of our social and commercial life is predicated upon its existence. There is today nothing known that can take the place of electrically propelled track units. What is essential must be continued, and to be continued must be adequately supported.

Our electric railway properties in the past four years have weathered storms which an industry less essential could not have survived. It has suffered financially and physically, but I am confident that the silver lining to the dark clouds through which we have passed is just beginning to show itself. We have gained what in the future will prove to be perhaps our most valuable asset—an enlightened public opinion. The industry today stands upon the threshold of a new cycle which will insure its continuation upon a stable, self-supporting basis. The days of large profits and inefficiency are over, and rightly so. However, the new era will mean security and a reasonable return for investors, better rewards for able and efficient management, better working conditions for employees and better service for the public.

Urban transportation depends upon four elements, namely, the investor, the employee, the management and the public. Its success will be directly commensurate with the co-operation of these four essential factors. Mutuality of interest must be secured, not theoretically but practically, in order to sustain that transportation which our cities must realize for their continued growth and development.

The experience of the last four years has held no inducements for investors, but on the contrary, has been a positive deterrent. Those with money already invested have struggled against heavy odds not alone to secure interest, but to prevent the integrity of the principal itself from being further jeopardized.

SHAMEFUL TREATMENT OF RAILWAYS DURING WAR

The treatment of the street railway industry at Washington evidenced a shameful failure on the part of our national government. Calling upon the industry for the utmost to provide an absolutely essential service properly to maintain our feverish war industries, it was driven almost to the breaking point. Yet the fact remains that with this demand for service went no corresponding relief for its exigencies. The industry was in the paradoxical position of being crushed by the very force which it was working night and day to maintain. War prices, exorbitant labor demands, decreased productiveness of man power, immediate and pressing financial obligations, all offsprings of war conditions, were forcing it daily to the brink of bankruptcy. On the other hand, municipal, state and governmental authorities were demanding more and more from the industry. And let it here be said to the credit of every man connected with the business, that this demand was met patriotically and unselfishly. War-time service was given at the actual out-of-pocket expense of those who had made the industry possible. Extensions were built, equipment was purchased, wages were raised, material prices were met, at a time when the operating revenues were not paying the operating expenses. The government, through its various emergency agencies, such as the War Finance Corporation, War Industries Board, Fuel Administration and the War Labor Board, combined to fix increased expenses, but absolutely refused to adjust revenues to meet these emergency prices. With the most extraordinary powers any central government ever possessed at its command, it never used one of them to assist an industry upon whose continued operation depended all the others.

The industry, actively to function, must have at least $500,000,000 in new money annually. There is only one source from which this can come, and that is the pockets of the investors of the United States. The credit of the street railway business must be restored as a condition precedent to its continued existence. The census is showing a tremendous population increase in all of our large centers, ranging from 20 to 50 per cent. There is a certain ratio of actual annual investment needed to this population increase. Unless this money is forthcoming, the transportation systems of our cities cannot grow with their population and our plants will be inadequate to care for the civic demands made upon them.

LABOR PRESENTS INCREASED DEMANDS

The human element in the electric railway industry has presented a pressing problem in the past few years, the solution of which has in many cases not yet been found. Taking advantage of war conditions, street railway employees, aided, inspired and abetted by the activities of the Amalgamated Association of Detroit, made demands, in many cases unreasonable, and which the industry was in no shape to meet. Many companies today are in financial straits due to a wage scale imposed upon them without any consideration other than the demands of the employees by the War Labor Board or some other agency. Intoxicated by its war time successes, the Amalgamated Association is today making increased demands. For example, a contract has been presented to the United Railways of St. Louis calling for a wage scale for trainmen of 85 cents an hour. Less than six months ago the Public Service Commission of Missouri arbitrated the present wage scale and granted a top wage of 60 cents per hour and an 8 cent cash fare to make possible the payment of the scale. To meet the present demands would re-

*Abstract of paper presented at convention of Oklahoma Utilities Association, Oklahoma City, March 9, 1920.

quire approximately $84,000,000 more a year. It is doubtful if the St. Louis company or any other could stand such an increase.

I think I am correct in making the statement that the industry, prior to 1913, in the majority of cases existed and paid its interest only through the fact that its employees were generally underpaid. Labor was plentiful, and the industry presented attractions to the prospective trainman that seemingly made up for low wages. We know now that labor conditions have entirely changed, and rightly so. No industry can successfully maintain a position founded upon low wages. It is its duty and obligation to pay fair wages that will not only attract high class men but will make their living conditions comparable with those in other lines. This obligation comes ahead of interest. It is one that must be fairly and squarely met in the future, and no community has the right to expect or demand service at the expense of the men whose manual labor makes this service possible.

The human element in the electric railway business is perhaps more important than in any other industry, inasmuch as our payrolls approximate 65 to 70 per cent of our yearly expense. And the unfortunate aspect of the situation is the fact that union domination stands in the way of our securing that co-operation and mutuality of interest in the business that we should have with our employees. Aside from the physical and economic reasons that make possible the continuation of a 5-cent fare in Philadelphia, much of the success of the traction company there is due to the co-operation it has been able to secure from its men. The present policy of the Amalgamated, to obtain as much and give as little as possible, to regard the company as its natural enemy and to continue extravagant demands without taking into consideration financial conditions, is a policy, I feel, that must be materially changed.

Co-operative Committees Work Well in Kansas City

I believe that much of our work in the future lies in this direction. As operators, it devolves upon us to change this strained and unnatural condition if we are going to secure that co-operation with our employees that spells success. You will pardon me in this connection if I dwell briefly upon our experiences in Kansas City. I believe today we have there the most favorable labor situation the company has ever enjoyed. It has been secured at the expense of a strike which cost the company more than $1,000,000. Under the leadership of the Amalgamated our men struck three times within a period of eighteen months, on two of which occasions they violated solemn contracts. Due to this union domination discipline was lax and we had anything but a co-operative spirit on the property. On several occasions our employees were instructed by their union leaders not to appear at division meetings called by the officials of the company to discuss matters of operation. Today we have practically an entirely new organization.

With this organization of men not affiliated with any union in any way, we immediately put into effect a new idea, which it seems to me is a large factor in preserving and maintaining proper relations with employees today. I refer to the shop committee system, which has worked so well in Philadelphia, in the Bethlehem Steel Works and in many other large institutions. It insures proper representation of employees on department committees and gives them an active participation in the affairs of the company in so far as they reflect on working conditions, discipline, etc. These committees are elected solely by the employees and represent them on any question that may arise. We have now been operating with this system for a year, and it has proven very satisfactory in every way. In spite of the fact that employees have the right of appeal to the president of the company, practically every case that has arisen has been settled with the division superintendent and the local committee at the barn. Not only does it give the employees a medium for insuring fairness in discipline matters, but it has a tendency to make subordinate officials play the game fairly, with the result that there is a closer degree of contact and better harmony at the very point where trouble formerly originated—that is, where the management directly comes into contact with the employees through subordinate officials.

During the year a number of matters have arisen on which we desired the advice and co-operation of the employees; for example, questions affecting seniority; changes in uniform; changing the method of payment from cash to check, and other matters. When these arose, the employees' committees were called in and the matter explained, and they were then asked to put the various questions up to the men. These committee meetings are also prolific of suggestions, many of which are of much value. They have a tendency to correct minor grievances at the source.

In connection with the work of these committees, we make it a point through the meetings with the committees and the men, and through our employees' publication, to keep the employees well acquainted with the financial condition of the company and its monthly statement in an effort to secure their interest and co-operation.

We also have a local Brotherhood on the property, which has a membership of approximately 2,300. This provides a $15 sick and accident benefit; seven days per month free medical attendance, and a $300 death benefit. The dues are $1.75 per month, in addition to which the company donates 50 cents per month per member.

We have cut out the so-called welfare work as it has been understood in the past. Our employees want their shower baths in their pay envelopes. They have never appreciated welfare activities when given in lieu of wages. I do not mean by this that it is not a solemn obligation of every employer to do everything possible to improve the physical, mental and spiritual side of his employees, but it can be done without handing the agencies for this improvement to them upon a silver platter. Interest the men so that they will provide their own welfare work. When they have done this they will appreciate it. It is something they are doing themselves through co-operative effort, and not presented to them by the company. The company can, of course, in connection with this render financial assistance, but only predicated upon the fact that the men themselves meet it half way in the work. Teach employees the benefits of co-operative activities for their own good will, but at the same time teach them the necessity of co-operating with the management in bringing success to the company.

Although it is still early to count our chickens, yet we believe these methods consistently followed will bring about a feeling of co-operation and mutuality of interest that we have never before enjoyed in our organization. If this is done, a very solid foundation will have been laid for the future progress of the Kansas City Railways. The enthusiastic, whole-hearted support of 4,000 employees is a powerful force in any community, however large.

New Problems Are Being Solved

From the standpoint of management many new problems have in the past year or two presented themselves, and many more will arise in the future. The day of inefficiency is over. In order to insure a fair return to our investors, good wages to our employees, and proper service to the public, it will require much more exacting application to the finer problems of operation than was necessary in the past.

The day of exploitation with its evils of overcapitalization and lax methods in management is past, and I believe the long train of evil results has worn itself out. The public has taken this matter in hand and through its various governmental agencies has forced square dealing where it was not given willingly. The old bugaboo of watered stock and financial mismanagement is practically out of the public mind, and to some extent the slate has been wiped clean, which in itself augurs well for the future of the industry.

And last, but not least, comes the public, which it is our obligation to serve, and without the co-operation of which we cannot obtain the maximum result. I know that great progress has been made in the past three years. In fact, from the first application for a fare increase there has been a constant campaign of education which has brought the street railway industry more clearly into the public mind. I feel that the necessities for fare increases are now known to practically every one. Furthermore, when the public can feel that the management has been efficient, that a fair valuation has been placed upon a property, and that good service is being maintained, there is little opposition to necessary fare increases. There was of course at first a violent reaction, fostered and supported by antagonistic newspapers and publicity-seeking politicians. This was evidenced by the fact that in practically every city fare increases were followed by a decrease in riding. Thus the Boston Elevated, after raising fares, was barely able for six months to meet its operating expenses. Now, with a 10-cent fare, it has not only been earning its interest, but making enough to wipe out a staggering deficit. The same has been true in Chicago, Cleveland and many other cities, and is also, although more slowly, the case in Kansas City.

These facts refute the stock argument of the politician and the antagonistic newspaper made some time ago that higher fares resulted in decreased riding to the extent that no benefits could result. This has been proved untrue in not only the street railway industry, but in all others. For example, newspapers formerly sold for a cent and now are selling at two, and selling more than they ever did. Automobiles have increased in price from 20 to 100 per cent and more are being produced than ever before. In every other line this is true. The street railway business perhaps suffered most in this respect from the peculiar psychological effect of a fare increase upon the public. Much of this of course was due to the antagonism of politicians and newspapers. Much more, however, can be attributed to the fact that the increased fare was impressed upon the public twice daily. In the case of electric and gas companies where the bill was paid once a month this was not true, and there has been practically no opposition to increased electric and gas rates throughout the country. If the public paid its car fare monthly, even a 10-cent fare would probably result in increased riding just as price increases have resulted in increased business in all other lines.

It now seems, however, that the public no longer connects a street car ride with 5 cents. The cost-of-service plan is more or less firmly fixed in the public mind, and in this step alone we have made a tremendous advance, for any industry that must sell its only output at a fixed price irrespective of its production cost is basically unsound and unstable. Unless that condition change, the industry must fail. There is no more relation between the price of car fare in Oklahoma City, Kansas City and New York City than of milk and eggs in the same communities.

Furthermore, there is an indication of a more direct public co-operation in other ways. Governing bodies and even antagonistic newspapers are beginning to see that if urban transportation in congested centers is to continue adequate for a city's needs every possible help must be extended.

Brighter Future Is Ahead

I am confident that we are today standing on the threshold of a brighter future for our industry. There are many other evidences of this than those outlined above. After all, our experience teaches us that the pendulum is constantly swinging and action is always followed by reaction. Perhaps for the first time in the last three or four years we have reached a somewhat settled state and are in a position really to operate our properties. We have adjusted fares. The labor situation is settling itself to some extent, and we have to deal with a more complacent and better educated public. The country has partially adjusted itself from the shock of wartime conditions, and on every hand we see evidences that it is the desire of business and labor to settle down and once more go to work. It looks as if the peak of high-price era has been reached, and from now on we may look for declining prices. Europe is again producing, and with a world once more at work, we may confidently look forward in the very near future to a readjustment approximating normal conditions and a resetting of a world thrown out of joint by the catastrophe of a war, a contingency never dreamed of.

The labor problem, it seems, is settling itself. The necessity for production and for an honest day's work for an honest day's pay is becoming impressed upon all classes. Labor is beginning to realize its vital part in the readjustment of the world's affairs.

We have had to fight our own battles without assistance. We have had to take our case to the public and to those governmental agencies that in many instances have not functioned until the very existence of the service upon which our cities depend was threatened. It does look, however, as if our efforts are to be successful and that a stable future is to be assured the street railway business. As stated before, these things have come about not only through the sacrifices

and efforts that have been made, but from the outstanding economic fact that as street railway service is absolutely essential to the well being of our cities, what is essential in our civilization must be continued, and what must continue must be adequately supported. The price of service must meet its cost, and for the first time since its inception the industry is getting itself upon a strictly business basis, where its product must be sold for what it cost, plus a fair and reasonable return to those who invested their money to make possible an essential public service.

N. F. P. A. Approves Code Revisions

FOLLOWING the public hearing held in New York City on March 23, the electrical committee of the National Fire Protection Association approved without material change the recommendations of the committee on cars and railways. This committee consists of Martin Schreiber, chairman; R. C. Bird and Ralph Sweetland. The following abstract covers the part of the report of the committee which was approved substantially as given:

New Carhouse Wiring Rules

The revision of the rules for carhouse wiring, as recommended below, was developed in co-operation with a committee appointed by the A. E. R. E. A. It has been approved by the standards committee of the A. E. R. E. A. as recommended practice and was ratified by the American Electric Railway Engineering Association on Oct. 8, 1919, at its annual convention at Atlantic City. Your committee, therefore, submits these carhouse wiring rules for the approval of the electrical committee and recommends them to be substituted for Rule 41.

Committee's Comments on Revisions in Rule 41

In revising these rules it was our thought to preserve as far as possible the intent of the old N. E. C. rules, but to put them in a form that would meet the wishes of the various parties interested.

(a) Trolley Wires—Intended to cover installations of 1,200 volts and over.

Paragraph 2 is new.

(b) Cutout Switches and Line Breakers — Railway engineers were unanimously opposed to binding themselves to any definite distance for line insulators such as 100 ft. or 50 ft. To cut the wires dead on surrounding streets is all that underwriters need ask for, and usually this can be accomplished by a 50 ft. distance. In some cities with narrow streets insulators must be placed less than 50 ft. from building.

Paragraphs 3 and 4 are new.

(c) New paragraph.

(f) New paragraph.

(h) Voltage raised to 750. Many companies carry 750 volts on their switchboards. This means that at times of no load voltage may go as high as 750.

(7) New paragraph.

The Rule Substantially As It Now Stands

41. Carhouses.

(a) Trolley Wires.

The trolley wires must be securely supported on suitable insulating hangers, designed for the voltage used, and must be placed at such a distance apart that the distance between any two hangers is less than the distance from the trolley wire to the floor or rail.

Wood troughing or sufficient protection to prevent trolley pole forming a contact with any metal part of building shall be provided.

(b) Cutout Switch and Line Breakers.

Must have an emergency cutout switch in an accessible location outside of the building so that all trolley wires in the building may be cut out at one point. Line insulators must be installed, so that when emergency switch is open, the trolley wire leading into the building will be dead at all points, preferably within 50 ft. of the building. In carhouses not used as operating stations, the current must be cut out of the building when not needed for use in the building.

In the feed to the carhouse is underground the emergency switch may be installed inside the building, but must be located at a point as near as practicable to where the underground feeder enters the building.

When carhouse or yard is divided into fire sections, auxiliary cutout switches shall be arranged to control each section independently and may be located inside of building near track entrance.

Trolley wires in car storage yards, or distinctive sections of a large storage yard, shall be controlled by an emergency cutout switch as described above. Yards in conjunction with carhouses shall be treated as a separate section and have auxiliary cutout switch.

(c) Approved lighting arresters shall be installed adequately to protect all overhead trolley wires in carhouses and car storage yards inside of the line insulators (breakers).

(d) Current collectors shall be removed from contact with trolley wire while cars are not in use. Suitable signs posted in conspicuous places are recommended.

(e) Must have all rails bonded at each joint with a conductor having a carrying capacity at least equivalent to No. 0 B. & S. gage annealed copper wire, and all rails must be connected to the outside ground return circuit by a not less than No. 0 B. & S. gage copper wire, or by equivalent bonding through the track.

(f) Power third rails shall be rigidly supported on suitable insulating supports and properly bonded at joints.

Power rails within each fire section of building or storage yards shall be controlled by an emergency cutout switch located in a readily accessible place outside of building.

(g) Except as hereinafter provided in Section h, all wiring and apparatus shall be installed in accordance with approved practice for constant potential systems.

(h) All lamps and stationary motors must be installed in such a way that one main switch may control the whole of each installation, lighting and power, independently of the main cutout switch called for in Section B.

When current for lighting, stationary motors, heating, testing apparatus, etc., is from a grounded trolley circuit, the following special rules to apply:

(1) Voltage from light, heat or power shall not exceed 750 volts.

(2) Approved cutouts and switches must be placed in the non-grounded side of lights and motors they are to protect. Light circuits must not exceed 2,000 watts, dependent upon a single cutout.

(3) Drops to lights shall be flexible rubber covered wire or packing house cable.

(4) In series systems sockets shall be of the keyless type and of a voltage rating for the current used.

(5) Electric heaters to be of standard type.

(6) The main ground, or return wire, shall connect with the rails or negative feeder at not less than two places, and shall be protected against mechanical injury.

(7) All cutouts and switches in grounded systems should be installed in cabinets of non-conducting material. Wooden cabinets shall be lined with ¼ in. fire-resisting insulating material and painted with a non-conducting paint.

(8) All light and power wiring where subject to mechanical injury shall be installed in metal conduit.

(i) All portable testing, lighting and power devices shall be constructed of standard materials, and to withstand hard usage. All pendant cords and portable conductors will be considered as subject to hard usage.

(j) Controlling devices and apparatus for feeder distributing systems for outside distribution must be installed in a fire resisting room or compartment.

Compensation for Engineers

IN a paper on classification and compensation of engineers, read at the Chicago meeting of the American Association of Engineers on March 15, A. S. Tuttle described the investigation made on this subject under the auspices of the Engineering Council. After outlining the duties of engineers of different grades and giving average and suggested salaries for engineers in the employ of municipalities and states, the speaker said, in part:

From the latest statistics available it seems probable that the cost of living is about 80 per cent more than in 1915. This, however, is not to be regarded as the basis for the recommendations of the committee, which are intended to insure to the young unmarried man an income sufficient on which to live, and to provide compensation for men in the higher grades sufficient not only to make up the increased cost of necessaries but also designed to provide for recognition of value not heretofore given. It is conceded that men drawing the major salaries should be the ones to make the sacrifices required to meet the war expense. An argument for increasing their pay in the same or greater proportion as for the men living on the lowest living wage would be fallacious if based on the decreasing value of the dollar. In this case the advance proposed is on the ground that it gives the engineer that to which he is entitled but which has heretofore been withheld.

The needs of the lower grades of service have now been met to some extent, and if the profession as a whole could unite in a movement to indorse every effort put forth to raise the compensation of chief engineers the remainder of the problem would be easy to solve. To secure permanent improvement and attract to and retain in the profession the best men, it is desirable to fix pay at entrance at a rate such as not to bring in men who are without engineering education or who have no natural leaning along engineering lines. Men admitted to the service should be denied advance unless decided merit is shown, in which case promotion should be certain and liberal. In this way standards can be raised and the mediocre men will not remain as a handicap to the progress of those more worthy. Before engineers can reach the very highest places in administrative work they must cultivate an increased breadth of view and accept more responsibility; they must give the business side of undertakings with which they are connected the same thought that they devote to the technical features.

It cannot be questioned that the long period of comparative inactivity in railroad construction and the return of the roads to their owners must be followed by a revival of enterprises of vast magnitude. The comparative freedom from governmental red tape which will now be enjoyed should open up a brilliant prospect to men in this service, and the speaker sincerely trusts that in the new era about to dawn his professional brethren who have in the past devoted themselves to this branch of engineering will realize their long deferred hopes for the day when members of this profession will find a proper financial reward for their services.

Zone Fares Successful in Holyoke

Based on 2-Mile Zones at 3 Cents Per Mile with 6 Cents Per Zone and No Reduced Rate Tickets—Conductors Make Hand Collections Zone by Zone with Overhead Registration—Transfers Unknown

THE zone system in effect since Nov. 9, 1919, on the lines of the Holyoke (Mass.) Street Railway is a model for simplicity, in that the rate of fare in each zone is uniform, free transfers are abolished except at one point in the suburban territory and reduced rate tickets—except those required by law for school children—are unknown.

GATEWAY TO THE CITY OF HOLYOKE

The result is that the system has proved satisfactory to the company in that it is giving sufficient revenues to meet the cost of service, although it has reduced the fare for the majority of car riders within the city of Holyoke itself, where by far the greater number of people ride. The conductors find the system of collection can be handled rapidly inasmuch as the difficulties of variable fares do not exist, no matter how heavy the traffic.

The Holyoke Street Railway is not a city system entirely. It operates about 57 miles of lines radiating from what might be termed the hub of the system, Holyoke City Hall, and serves a population of approximately 120,000, one-half of which is within the borders of the city of Holyoke.

The accompanying map shows the track layout of the system and the length and location of each fare zone.

In general the average length of the twenty-eight zones on the various routes is 2 miles. This with a minimum zone fare of 6 cents gives a theoretical rate of 3 cents per mile. The area included within the first zone from City Hall, as shown on the map, includes practically all of the business district as well as the built up residential section of the city. This zone limit is in several cases at the actual borders of the city, although in laying out the system the plan of following the city boundaries was not the basis used, but instead the limit was placed so as to take care of the greatest number of patrons within certain fixed distances from the center of the fare structure.

This plan gives a symmetry of zones with an average in the city of Holyoke of 1.97 miles, and 2.16 miles in the suburban territory for what is known as the Holyoke division, comprising 63.8 per cent of the total mileage. In the Amherst and Sunderland division, which has 18.84 miles of line, the eleven zones average 2.04 each.

The table on page 750 gives the actual length of each zone.

Cash Fares: The regular rate of fare in any zone shown on the map is 6 cents cash. When accompanied by an adult, one child under five years is carried free, providing, however, such child does not occupy a seat required for a paying passenger. Any other child must pay the regular fare.

Transfers: No transfers are issued to connecting routes in any zone except the one which includes the center of the town of Amherst, namely, "N." In this case free transfers are issued to enable passengers to change from the Amherst-Sunderland route to the Orient Springs route and *vice versa* without paying two single zone fares.

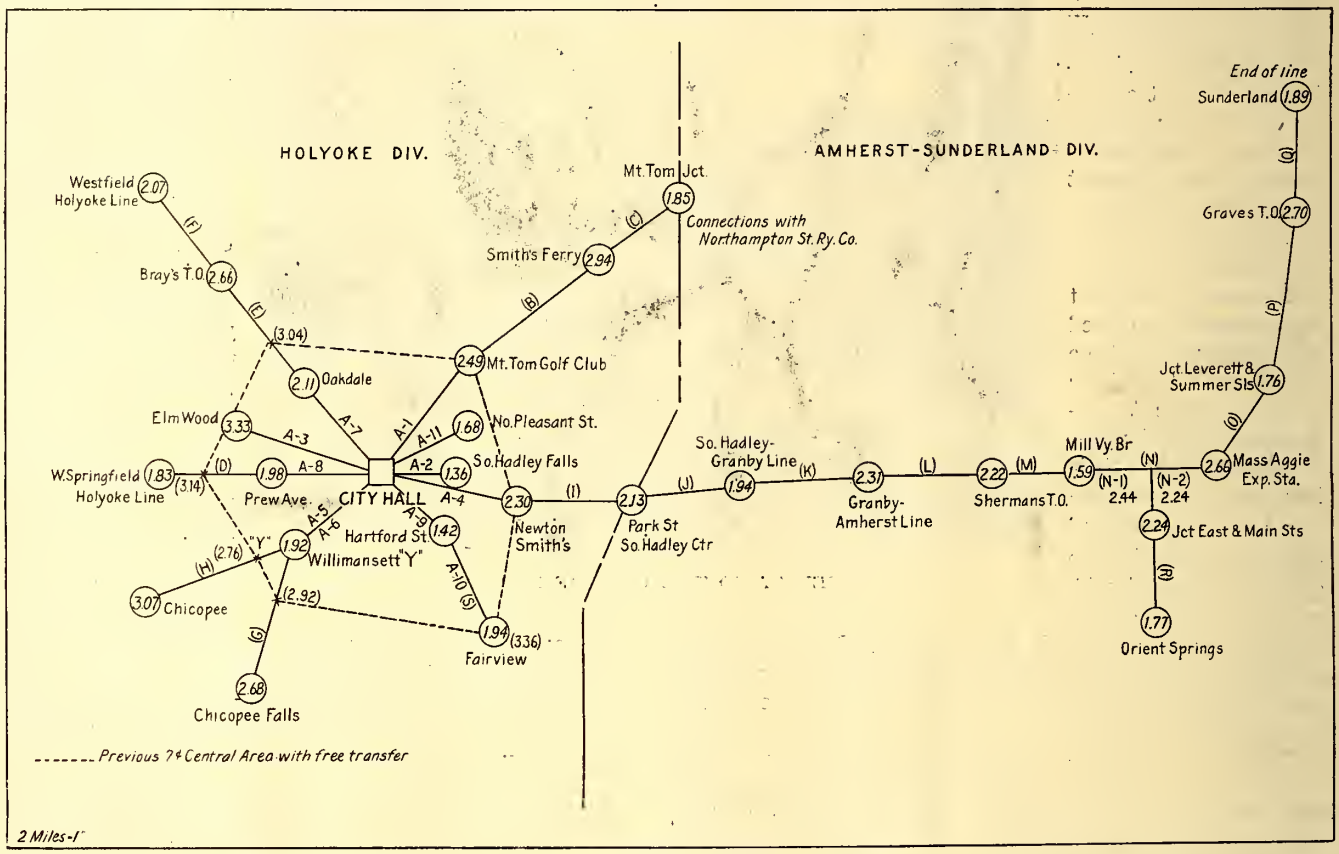
Ticket Fares: The only reduced rate tickets sold by the company are to school children inasmuch as all electric railway companies in the State of Massachusetts are required to sell such tickets at one-half the regular fare. Coupon tickets are sold in strips of ten for 30 cents at the offices of the company in Holyoke and South Amherst, each coupon of which is good for a single zone ride. Pupils, however, when purchasing such tickets must present a certificate duly signed by the school teacher verifying the signature of the pupil. This certificate becomes the property of the railway company whenever presented for the purchase of tickets. Such tickets are not valid for passage until countersigned by the pupil at the time of purchase. The name of school attended is also stamped in the ticket contract.

Full fare bearer tickets, in strips of five for 30 cents, are sold at the company's offices and also by all conductors when on duty. These tickets were put on sale merely as a matter of convenience to the conductor and the car rider so as to facilitate fare collections and at the same time reduce to a minimum the necessity of making change for a multiple coin fare. These tickets entitle users to the same privileges as the cash fare and

have proved popular. Two months after they were put on sale approximately 10 per cent of the daily transportation revenue was derived from the use of these tickets. This percentage is constantly increasing and the company anticipates that during the summer months a far greater proportion of its riders will buy these tickets.

Free transportation is furnished all employees. The same form, however, is not universally used. Permanent employes receive an annual card pass which is good for transportation on any car during the calendar year; temporary employees such as call men in the transportation department, or employees who are regularly employed during certain seasons of the year such as in the company's parks during the summer, receive a sixty-zone monthly card pass, which the conductor punches in every zone, at the time it is presented for fare. The color of this sixty-zone ride card pass is changed each month. A trip pass is also available for issuance to employees not in the service long enough to get a monthly pass. This latter from of ticket must, however, be filled in and punched as required before it will be accepted for transportation.

Special Cash Fares have been established on tripper cars in both the A.M. and P.M. rush hours in certain cases to avoid the issuance of so-called workingmen's or reduced rate tickets. The controlling factor in all such cases is that either the factory or the community settlement is located in the middle of a zone and unless such fares were established passengers would pay in reality



HOLYOKE DIVISION

Zone Number	Between Points Applying	Route	Length (Miles)
A-1	City Hall and Highlands (Mount Tom Golf Club)	Northampton	2.49
*A-2	City Hall and North Main Street, South Hadley Falls	South Hadley Falls	1.36
A-3	City Hall and Elmwood	Elmwood	2.33
A-4	City Hall and Newton Smith's (Granby Road)	South Hadley Center	2.42
A-5	City Hall and Willimansett "Y"	Chicopee	1.92
A-6	City Hall and Willimansett "Y"	Chicopee Falls	1.92
A-7	City Hall and Oakdale (Hillside Avenue and Cherry Street)	Westfield	2.11
A-8	City Hall and Prew Avenue	Springfield	1.98
A-9	City Hall and Hartford Street	Fairview	1.42
†A-10	Hartford Street and Fairview	Fairview	1.94
A-11	City Hall and North Pleasant Street	North Pleasant Street	1.68
B	Mount Tom Golf Club and Smith's Ferry	Northampton	2.94
C	Smith's Ferry and Mount Tom Junction	Northampton	1.85
D	Prew Avenue and West Springfield-Holyoke Line	Springfield	1.83
E	Hillside Avenue and Cherry St. and Bray's Turn-Out	Westfield	2.66
F	Bray's Turn-Out and Holyoke-Westfield Line	Westfield	2.07
G	Willimansett "Y" and Chicopee Falls	Chicopee Falls	2.68
H	Willimansett "Y" and Chicopee	Chicopee	3.07
I	Newton Smith's and Park Street	South Hadley Center	2.13

*End of Line. †Otherwise known as Zone S.
Average length of nine Holyoke city zones ..... 1.97 miles
Average length of nine suburban zones ..... 2.35 miles
Average length of 18 zones — Holyoke Division 2.16 miles

AMHERST AND SUNDERLAND DIVISION

Zone Number	Between Points Applying	Route	Length (Miles)
J	Park Street, South Hadley Center and South Hadley-Granby Line	Amherst	1.94
K	South Hadley-Granby Line and Granby-Amherst Line	Amherst	2.31
L	Granby-Amherst Line and Sherman's Turn-out	Amherst	2.22
M	Sherman's Turn-out and Mill Valley Bridge	Amherst	1.59
N	Mill Valley Bridge and Massachusetts Agriculture Experimantal Station	Amherst	2.66
N-1	or Junction of East and Main Streets	Pelham	2.44
N-2	Junction East and Main Streets, and Massachusetts Agriculture Experimental Station	Amherst-Sunderland	2.24
O	Massachusetts Agriculture Experimental Station and Junction of Leverett and Summer Streets	Amherst-Sunderland	1.76
P	Junction Leverett and Summer Streets, and Graves Turn-out	Amherst-Sunderland	2.70
Q	Graves Turn-out and end of line	Sunderland	1.89
R	Junction East and Main Streets, Amherst and end of line, Orient Springs	Pelham	1.77

Average length of eleven zones....2.04 miles
Average length of twenty-nine zones — entire system, 2.12 miles

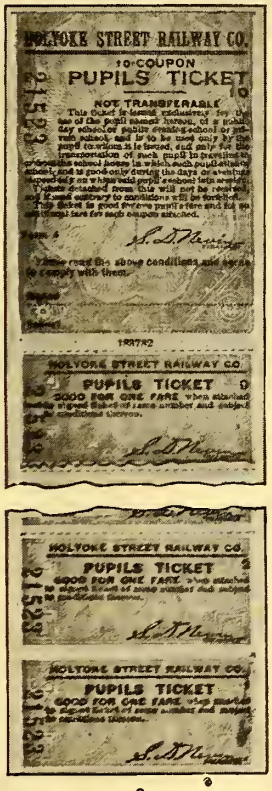
MAP AND KEY SHOWING ARRANGEMENT AND LENGTHS OF ZONES

an extra zone fare for which they received nothing in return. Such service of this character as is operated, together with the fare charged and the full fare on regular cars, is shown in the following table:

SPECIAL FARES ON THROUGH TRIPPER SERVICE AND COMPARATIVE FARE ON THROUGH CARS

	Distance (Miles)	Hours	Fare on Trippers (Cents)	Regular Fare (Cents)	Zones
From Fairview to Chicopee Falls	5.72	5:45 — 6:30 a. m.	18	24	4
From Chicopee Falls to Fairview	5.72	5:00 — 5:30 p. m.	18	24	4
From Fairview to Williamsett Bridge	5.01	5:45 — 6:30 a. m.	12	18	3
From Willimansett Bridge to Fairview	5.01	5:00 — 6:00 p. m.	12	18	3
From Fairview to Berkshire Street	4.14	6:00 — 7:00 a. m.	12	18	3
From Berkshire Street to Fairview	4.14	5:00 — 5:30 p. m.	12	18	3

1



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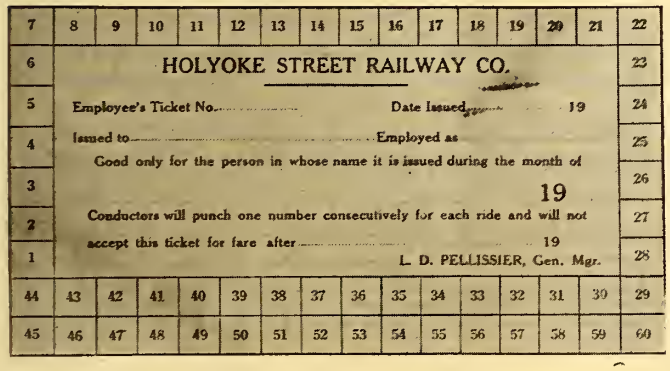
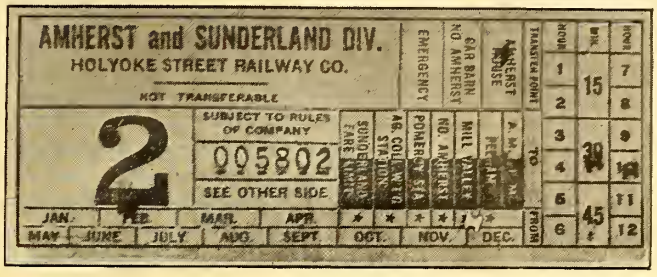


3

All closed and open cars are equipped with a single overhead register. In general, all cash and ticket fares collected in each zone are rung up on the overhead register, which records 6 cents for each registration with the exception of the Springfield-Holyoke Limited cars, where each registration has a value of 12 cents, due to the fact that conductors collect both zone fares between the Holyoke City Hall and the West Springfield line at once. All revenue tickets are rung up on this same register. Transfers and trip passes collected are not registered, but turned in at the end of the day's run in a special envelope.

The company in its accounting keeps traffic records somewhat different from those of other companies, aiming to get the number of zone riders paying cash or ticket fares or riding on free passes. No attempt is made to get the actual number of passengers carried or the number of zones ridden by each passenger.

The form of day card in use, shown in an accompanying illustration, is designed so that the conductor can by straightforward addition get the total zone riders on each trip or run. On the face of the day card



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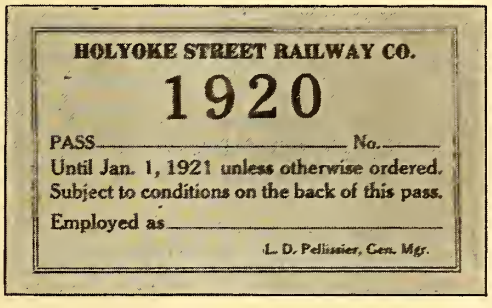

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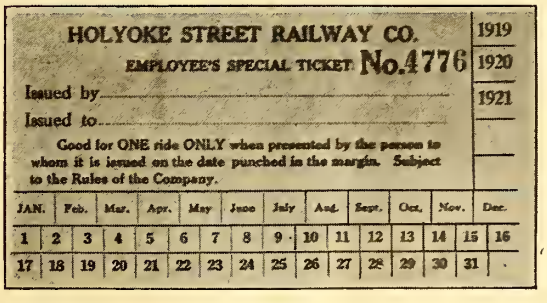

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1. STRIP OF FIVE TICKETS SOLD FOR 30 CENTS
2. PUPILS' TICKETS
3. MONTHLY PASS
4. AMHERST TRANSFER
5. ANNUAL PASS
6. EMPLOYEES' SPECIAL TICKET

is kept a record by trips and a summary for each run. It is essential that a separate day card be kept for each run in order that the accounting department can keep comparative records for each of the several routes operated. This is particularly true where conductors during a day operate over two or more regular runs. The conductor at the time of taking his car posts in the columns in the upper left-hand corner the register

HOLYOKE STREET RAILWAY CO.

CASH STATEMENT

By................ Cond. No..........

.................191......

Bills,		
Silver Dollars,		
Half "		
Quarter "		
Dimes,		
Nickels,		
Pennies,		
Total Cash, $		

1

HOLYOKE, MASS.,..............................191.....

HOLYOKE STREET RAILWAY COMPANY

CONDUCTORS OFFICIAL RECEIPT

CASH COLLECTIONS AS PER DETAILS ATTACHED $..................

BY .... CASHIER

VERIFIED .... CONDUCTOR

No. C 64212

2

Holyoke Street Railway Company

CONDUCTOR

NUMBER OF TICKETS INSIDE

~~10c Tickets~~ ....

~~7½c Tickets~~ ....

~~6⅔c Tickets~~ ....

6c Tickets ....

School Tickets ....

Coupons ....

Total ....

Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday

AM	PM	MIN
1	1	5
2	2	10
3	3	15
4	4	20
5	5	25
6	6	30
7	7	35
8	8	40
9	9	45
10	10	50
11	11	55
12	12	

Line Number

1	5	9
2	6	10
3	7	11
4	8	12

NOTICE

Tickets for each half trip must be placed in separate envelopes and deposited at the ticket office on each round trip.

Conductors will write their names, the number of each kind of ticket placed in the envelope, punch number of the line and the day, hour and minutes of deposit at the ticket office.

3

HOLYOKE STREET RAILWAY CO.

NAME OF CONDUCTOR

....

Conductors No's..........................

No. transfers inside..........................

Sunday
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday

A.M.	P.M.	Min.
1	1	
2	2	5
3	3	10
4	4	15
5	5	20
6	6	25
7	7	30
8	8	35
9	9	40
10	10	45
11	11	50
12	12	55

Line No.

1	6	11
2	7	12
3	8	13
4	9	14
5	10	15

NOTICE.

Transfers for each round trip to be deposited on passing collection box.

Conductors will write their name and number, the number of transfers placed in envelope; also punch number of run, day, hour and minute, of depositing envelope in box provided for the purpose.

4

1. CASH SLIP. 2. CONDUCTOR'S OFFICIAL RECEIPT. 3. TICKET ENVELOPE. 4. TRANSFER ENVELOPE

number, the time, and the opening number on the register totalizer and then lists the run number and points applying.

Trip figures are kept by the conductor to show collections for each fare zone. All revenue passengers, the fares of whom are registered on the car in each fare zone, are recorded in the column "Fares Registered." This reading, which is representative of the total number of cash and revenue ticket fares collected in that zone, is detailed in the respective columns to show cash fares, regular tickets, *i.e.*, full-fare tickets, school or pupils' tickets, and special tickets that are registered.

HOLYOKE STREET RAILWAY COMPANY

CONDUCTOR'S DAY SHEET — Be Certain That Section Numbers Are Correct Date..................19....

CONDUCTOR..................No.......... MOTORMAN..................No..........

Reg. No.	Time	From	Started	Ended	Fares Reg'd	Given To	Time

Figuring Space For Conductor

SUMMARY	Section	Section	Section	Section	Section	TOTAL	REVENUE
Cash Fares							
Regular Tickets							
School Tickets							
Special Tickets							
TOTAL							

RUN NO.................. BETWEEN AND

Important! Fill Out Columns Below

Car No.	Leaving Point	Exact Leaving Time	SECTION Cash Fares	Regular Tickets	School Tickets	Special Tickets	Fares Registered	SECTION Cash Fares	Regular Tickets	School Tickets	Special Tickets	Fares Registered	SECTION Cash Fares	Regular Tickets	School Tickets	Special Tickets	Fares Registered	SECTION Cash Fares	Regular Tickets	School Tickets	Special Tickets	Fares Registered	SECTION Cash Fares	Regular Tickets	School Tickets	Special Tickets	Fares Registered
		AM PM																									
		AM PM																									
		AM PM																									
		AM PM																									
		AM PM																									
		AM PM																									
Carry Totals Forward To Summary																											

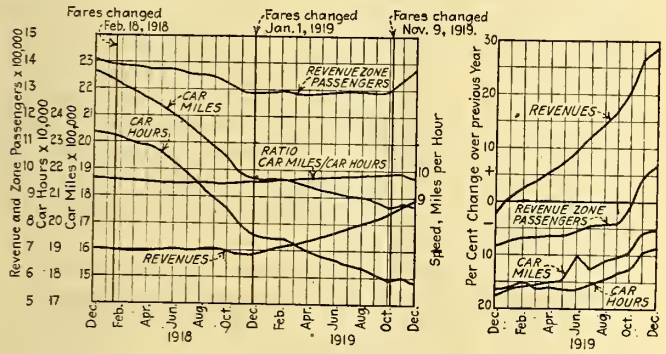
SECTIONS
Between points as follows.

A- 1 City Hall and Highlands (Mt. Tom Golf Club)
A- 2 City Hall and South Hadley Falls (No. Main St.)
A- 3 City Hall and Elmwood
A- 4 City Hall and Newton Smith's (So. Hadley Centers line)
A- 5 City Hall and Willimansett (Chicopee Line)
A- 6 City Hall and Willimansett (Chicopee Falls Line)
A- 7 City Hall and Oakdale (Cherry, & Hillside Ave.)
A- 8 City Hall and Prew Ave., So. Holyoke.
A- 9 City Hall and Hartford St., Fairview Line.
A-10 Hartford St., Fairview and end of Fairview line
A-11 City Hall and No. Pleasant Street
B- Mt. Tom Golf Club and Smith's Ferry
C- Smith's Ferry and Mt. Tom Jct.
D- West Springfield—Holyoke line and Prew Ave., So. Holyoke
E- Cherry St. and Hillside Ave. and Bray's Turnout on Westfield line
F- Bray's Turnout and Holyoke—Westfield Town Line
G- Chicopee Falls and "Y", Willimansett
H- Chicopee and "Y," Willimansett
I- Newton Smith's and Park St., South Hadley Center

DAY CARD USED BY HOLYOKE STREET RAILWAY

On completing the zone collection or on reaching the zone limit the conductor turns the register "down," and then enters the car and makes the collection for that zone. No particular trouble has been experienced due to complaints on the part of the conductors as to inability to make a collection in the time required for a car to traverse the length of a zone. Cars as a rule have a speed of approximately 12 to 15 m.p.h., and this with stops gives the conductor from eight to ten minutes to make a zone collection and post his day card.

At the end of the day the conductor totals the various columns for each fare zone and makes a summary of his work in the space provided in the upper right hand corner of the day card. He lists the cash and also converts the tickets collected into money so as to arrive at the total money equivalent for the day. Under this plan, it is possible to obtain the approximate previous day's receipts with a minimum of effort in a very short time by simply totaling the figures of the "Total Revenue" columns on conductors' day cards on an adding machine.

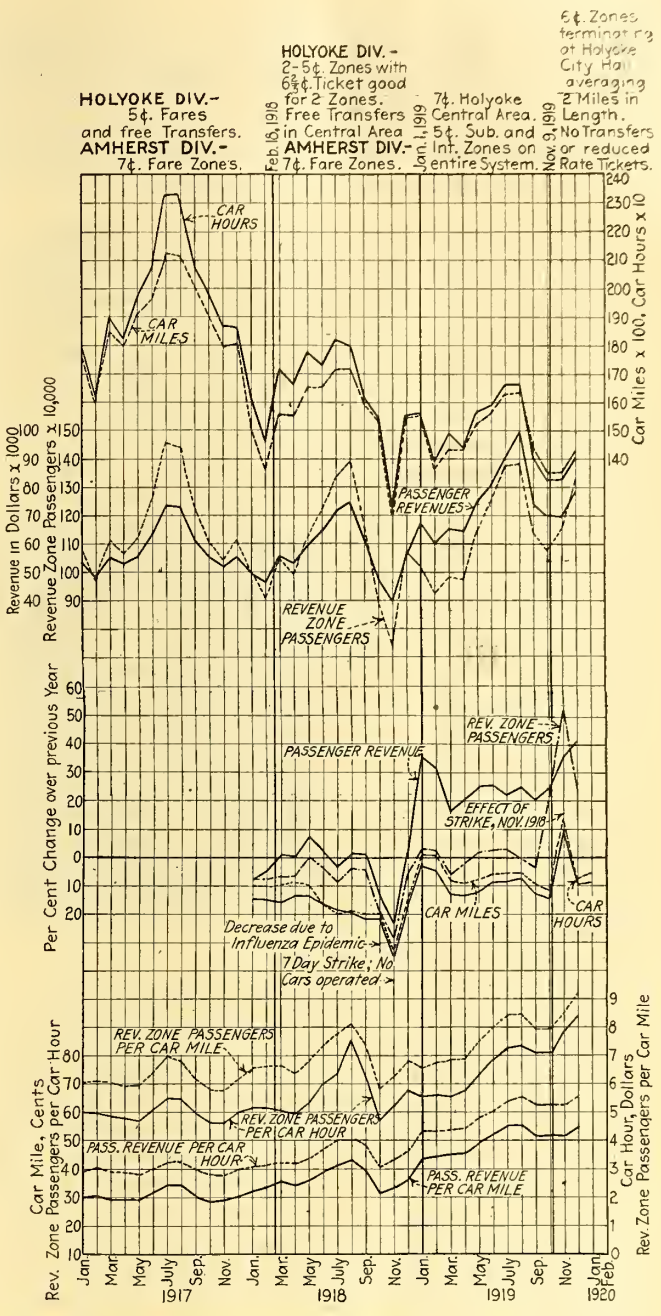


AT LEFT—TWELVE MONTHS' PROGRESSIVE TOTALS. AT RIGHT—PERCENTAGE VARIATION YEAR 1919 OVER 1918

No car register card is used, for all register readings are summarized and reconciled with fares registered and with a special register reading report which is posted each time a car leaves and enters the car house.

Conductor's Turn-In

On completion of a day's work all conductors make a daily turn-in to a receiver at the car house. To facilitate counting the receivers require a regular form of cash statement, showing the amount of cash in the various denominations that accompany the turn-in.



FINANCIAL RESULTS OF THE SEVERAL FARE SCHEDULES IN GRAPHICAL FORM

STATISTICS AS TO VARIOUS FARE SCHEDULES

	Year Ended Dec. 31, 1917	Feb. 18, 1918, to Dec. 31, 1918	Jan. 1, 1919, to Nov. 8, 1919	Nov. 9, 1919, to Dec. 31, 1919
Rate of fare	5-cent central area free transfers 5-cent suburban zone.	5-cent central area free transfers 5-cent suburban zones; 7-cent interurban zones	7-cent central area 5-cent suburban and interurban zones	6-cent zones in former central area 6-cent suburban and interurban zones
Length of ride for one fare, central area	Maximum 10.06	Maximum 6.67; average 2.26	Maximum 6.40; average 2.54	Maximum 2.33; average 1.97
Suburban and interurban zones	.....	Maximum 3.77; average 2.58	Maximum 2.94; average 2.07	Maximum 3.07; average 2.18
Number of zones	.....	7	18	29
Car-Mile Statistics:				
Passenger revenue (cents)	30.78	37.50	49.81	52.39
Operating revenue (cents)	30.84	37.52	51.54	54.12
Operating expenses (cents)	24.21	31.21	39.71	37.20
Revenue zone passengers	6.20	6.84	7.61	8.91
Transfer zone passengers	0.68	0.83	0.73	0.01
Total zone passengers	6.88	7.67	8.34	8.92
Car-Hour Statistics:				
Passenger revenue	$2.98	$3.56	$4.91	$5.34
Operating revenue	3.00	3.58	5.08	5.51
Operating expenses	2.34	2.98	3.90	3.76
Revenue zone passengers	59.5	65.4	75.0	90.5
Zone passengers	6.5	8.0	7.2	0.1
Total zone passengers	66.0	73.4	82.2	90.6

* Holyoke Division only.

The receiver takes the cash, checks it to the slip and makes out in duplicate a "conductor's official receipt," leaving the duplicate in a book for future auditing and reference. The conductor signs this receipt and it is attached to his day card to signify that he has turned in the day's receipts, subject to a final checking by the auditor's office for errors and omissions.

Financial Results of the Various Systems

Previous to Feb. 18, 1918, fares in the Holyoke Division were based on 5-cent units except in the Amherst and Sunderland Division, where 7 cents was the unit.

In the Holyoke Division the ride for a nickel was comparatively long in certain cases, ranging from 7.26 to 10.06 miles in twelve instances. Possible rides of more than 6 miles were frequent. On Feb. 18, 1918, zone fares were first established in the city of Holyoke at 5 cents per zone, with a reduced rate ticket at six for 40 cents (6⅔ cents) for a ride between any point in the central zone and any point in the adjacent outlying zone. This fare schedule was in effect until Dec. 31, 1918, and showed an actual loss in revenue, although if conditions surrounding the influenza epidemic in October, 1918, and the strike in November of the same year are discounted, so as to make the earnings so far as possible comparable with those of the previous year, it is believed that the theoretical increase would have been 1.2 per cent in passenger revenue. Actual increase in 1918, however, exclusive of the two months, October and November, varied from a maximum of 7.38 per cent for May to a decrease of 2.87 per cent for July. The details as to the layout of this plan were given in the ELECTRIC RAILWAY JOURNAL for Jan. 12, 1918, pages 77-80, and Sept. 14, 1918, page 458.

On Jan. 1, 1919, another scale of fares on a somewhat different basis was established. This plan had a central area including a part of the first outlying 5-cent zone, and a fare of 7 cents with free transfers in this area. In reality the minimum fare in the central area and the fare to the limit of the former first suburban or outlying zone was increased 2 cents. Suburban and interurban zones were shortened and had a fare of 5 cents. The reason for this increase was the inability of the company to secure the anticipated revenue from the system allowed by the Massachusetts Public Service Commission to become effective on Feb. 18, 1918.

This system showed a considerable greater earning power than the one superseded, as will be noted by the accompanying curves. The first month's operation showed a 35 per cent increase over the old system of fares, while for the period Jan. 1 to Aug. 1, 1919, the average increase was approximately 32.8 per cent with but little if any traffic loss. The tickets under this system, of which there were three, namely, a 10-cent ticket sold in lots of five for a 12-cent, two-zone ride at any hour of the day; a 7-cent ticket also sold in lots of five for a 10-cent, two-zone ride, during certain hours of the day; and a full-fare 7-cent ticket for use in the central zone, produced 29 per cent of the total passenger revenue. While this percentage may seem small, actual observations would indicate that in the first outlying zone nearly 75 per cent of the passengers rode on 10-cent and 7-cent reduced rate tickets.

In August, 1919, an award was given by a local board of arbitration, increasing the wages of all employees approximately 33 per cent, and inasmuch as the system of fares then in effect failed to earn sufficient revenue to pay this increase it became necessary to seek the additional revenue.

The company believed that the minimum fares should be kept as low as possible and few changes if any made in the suburban fare limits in order that the traffic loss may also be kept at a minimum. Bearing this in mind a rate structure was built up with 2-mile zones with a minimum fare of 6 cents per zone. Actual results from operation have proved that this was the correct diagnosis, for the loss in traffic has been nil and practically the theoretical increase in revenue anticipated has been actually realized.

Car-mile passenger revenues average 51.50 cents in November, 1919, as against 33.39 cents for 1918 and 29.06 cents for 1917, while car-hour earnings that averaged $2.78 in 1917 and $3.32 in 1918 have increased to $5.25 in November, 1919. Against this, operating revenues have also increased from $3 in 1917 to $5.47 in November, 1919.

The table on page 753 and accompanying diagrams show the actual monthly and periodical variations in the four different rate structures. It is to be noted that the schedule in effect on Nov. 9 last shows the best earning power of the four schedules shown—due principally to the fact that the company by keeping the minimum fare at the lowest possible point and eliminating transfers has been able to increase instead of decrease the riding habit.

Welfare Work Among Philadelphia Employees

CO-OPERATIVE welfare work is proving successful in Philadelphia, according to the last P. R. T. report. Last September the membership in the Co-operative Welfare Association had reached 99.51 per cent of the eligible employees. The company in recognition of this record doubled its contribution to the association and, effective Jan. 1, 1920, is contributing $20,000 monthly. This sum is equal to $2 for each $1 of dues paid by the members.

During the first 16 months existence, that is up to Dec. 31, 1919, the association paid $1,000 life insurance to the beneficiaries of 184 employees. Sick benefits were paid to 1645 employees at the rate of $1.50 per day, totaling $75,572.50. Pensions have been paid to ninety-nine employees at the rate of $40 per month. On Dec. 31 the total pensions being paid were at the rate of $47,520 per year.

In October, 1919, a savings fund was opened by the employees and on Dec. 27, 1919, over two-thirds of the membership had opened accounts, with an average of $10 a month to each account. Prediction is made that prior to the next annual meeting, which will be in September, 1920, 80 per cent of the members would have savings accounts and the accumulated total would be more than $1,000,000.

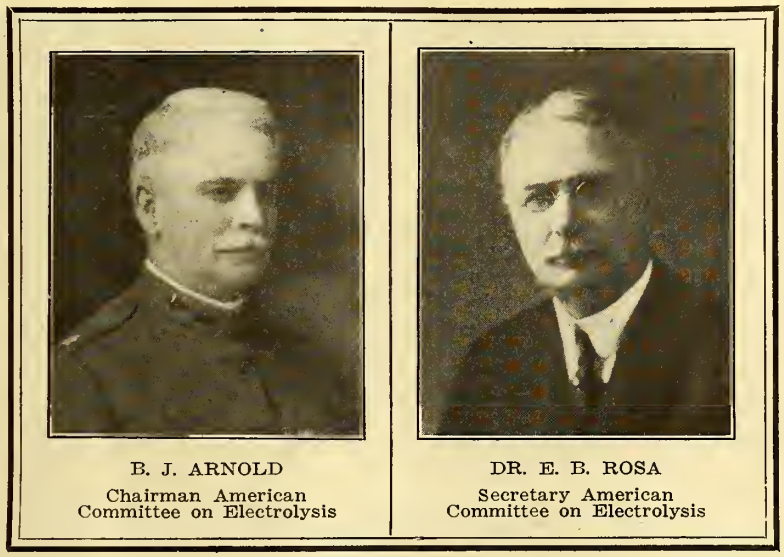
Safety Cars Cheap to Run

THE report of the Committee of One Hundred of the Kansas City (Mo.) Chamber of Commerce indicates that the thirty one-man safety cars have proven economical in operation. The total cost of operation is about 19 cents per car-mile, as compared with 32 cents for the larger cars, even though operators are paid 5 cents more than regular trainmen.

Co-operation in Electrolysis Research

Research Sub-Committee of American Committee on Electrolysis and United States Bureau of Standards Are Working Jointly in Collecting and Digesting Data

FROM time to time the ELECTRIC RAILWAY JOURNAL has discussed the work of the American committee on electrolysis and its predecessors and the researches which have been made by the United States Bureau of Standards. Now that the American committee is taking up its work again actively, with meetings of the research sub-committee held on the last Friday of each month, it is appropriate to review the whole program of research on prevention of electrolysis from stray electric currents as planned by the American committee in co-operation with the Bureau of Standards. The present article has been prepared with this idea in view.



B. J. ARNOLD
Chairman American Committee on Electrolysis

DR. E. B. ROSA
Secretary American Committee on Electrolysis

Those who were concerned with the operation of electric railways in the nineties and the early years of the present century will recall the incredulity and surprise attending the first evidences of stray-current electrolysis, and how this surprise was followed by dismay as increasing numbers of pipes were unearthed showing the ravages of unconfined currents. It was a phenomenon entirely new and unforeseen to the railway engineers as well as the pipe and cable-owning companies, and one for which no effective remedy was known. In those early days the return circuit was not given the attention that it now receives, partly because the importance of the electrolysis problem was not appreciated, partly because of the primitive state of the art of rail bonding and often because the earth was intentionally relied upon to carry the return current, on the assumption that it offered no electrical resistance.

The history of the development of rail bonding is in itself an interesting story and those who are familiar with it know that the number of types of bonds which have been used is legion. The bonded rail joint has been the weakest link in the return circuit and until the adoption of the welded joint, now commonly used in the larger cities, was responsible more than any other one thing for the extremely bad electrolysis conditions which existed in many cities. With the improvement of the return circuit through the use of heavier rails, better bonds, welded joints and supplementary feeders, railway loads also increased and often at a rate far greater than the increase in the return circuit. The result was that with the phenomenal growth of the electric railways those factors which were not vitally and immediately necessary to the operation of the cars were often slighted or entirely neglected. In not a few instances the electrolysis problem was one of the factors neglected during this early period.

From the very first appearance of electrolysis, nearly thirty years ago, there has been no end of speculation and uncertainty concerning the whole subject. The difficulty of observing the extent and progress of damage on underground structures; the rapidly changing conditions resulting from extensions, improvements and abandoned power stations; the great variations in local conditions, as, for example, earth resistance and different types of roadbed, as well as many other factors, all contributed to the difficulty of adequately analyzing and solving the problem. Many methods of correcting the trouble were proposed and used, but no standard practice has ever been agreed upon in this country other than the maintenance of the return circuit to the highest standard practicable. The cable-owning interests early found that a substantial degree of protection could be secured by draining the sheaths of the cables in areas where they were found to be positive to the earth, to the negative railway bus or to some other point on the return circuit, and this practice has been and now is consistently followed. The same method was employed, in some cases by the railways and in others by the water and gas companies, in an effort to protect the underground piping systems. This method of electrolysis mitigation, known as pipe drainage, though widely used, is in disrepute among many engineers and pipe-owning companies.

A DECADE OF INVESTIGATION BY THE BUREAU

It was because of the wide divergence of opinion and the lack of engineering knowledge on the subject of electrolysis, as exhibited by many requests for information, that the Bureau of Standards took up a general study of the whole problem in 1910. The first efforts of the bureau in this field were devoted to a study of some of the more important fundamental principles involved. Laboratory and field investigations were carried out and reports were published on many phases of the electrolysis problem. These included electrolysis in concrete; the laws governing the electrolytic corrosion of iron and lead; earth resistance, and its relation to electrolysis of underground structures; leakage resistance of electric railway roadbeds; modern practice in the construction and maintenance

of rail joints and bonds, and the principal methods that have been proposed for electrolysis mitigation. Numerous field surveys were also made by the Bureau of Standards and these have not only formed the basis for a publication on the methods of making electrolysis surveys, but have given an opportunity to experiment with different methods of mitigation. The reports of these various laboratory and field investigations have had a wide distribution and have been very helpful to engineers in bringing about better electrolysis conditions.

AMERICAN COMMITTEE ON ELECTROLYSIS FORMED

In 1913 through the activity of some members of the American Institute of Electrical Engineers, the American committee on electrolysis, first known as the joint national committee on electrolysis, was organized, representing the following organizations in addition to that already mentioned: American Electric Railway Association, American Gas Association, American Railway Engineering Association, American Telephone & Telegraph Company, American Water Works Association, National Electric Light Association, Natural Gas Association, National Bureau of Standards. On Feb. 25, 1914, at the second regular meeting of the committee, the following statement was made as the reason for its formation and is evidence that the committee was fully aware of conditions as they existed at that time:

> Electrolytic controversies have in the past given rise to unnecessary and acrimonious disputes, and not infrequently have resulted in litigation between the corporations concerned. The usual procedure in disputes of this kind has been for each side to employ one or more electrical experts who generally disagree as to the cause of the trouble and the remedies therefore. The dispute sometimes gets into the newspapers, occasioning unpleasant notoriety and resulting in more or less drastic municipal action by the city government concerned. Much of this could be avoided if a body such as this committee could be created which would consider broadly the questions covered by the controversy, without attempting to pass upon the questions at issue, but to report back to their respective organizations so that in time the committee would come to be recognized as a neutral body whose decisions would be authoritative, the same as the standards committee of the American Institute of Electrical Engineers in connection with matters of definition and standardization, which is a recognized authority that nobody ever attempts to question. With that end in view the institute initiated the movement to organize a national body to consider the general subject and agree upon any basic principles or methods of procedure to be followed in the case of electrolysis disputes.

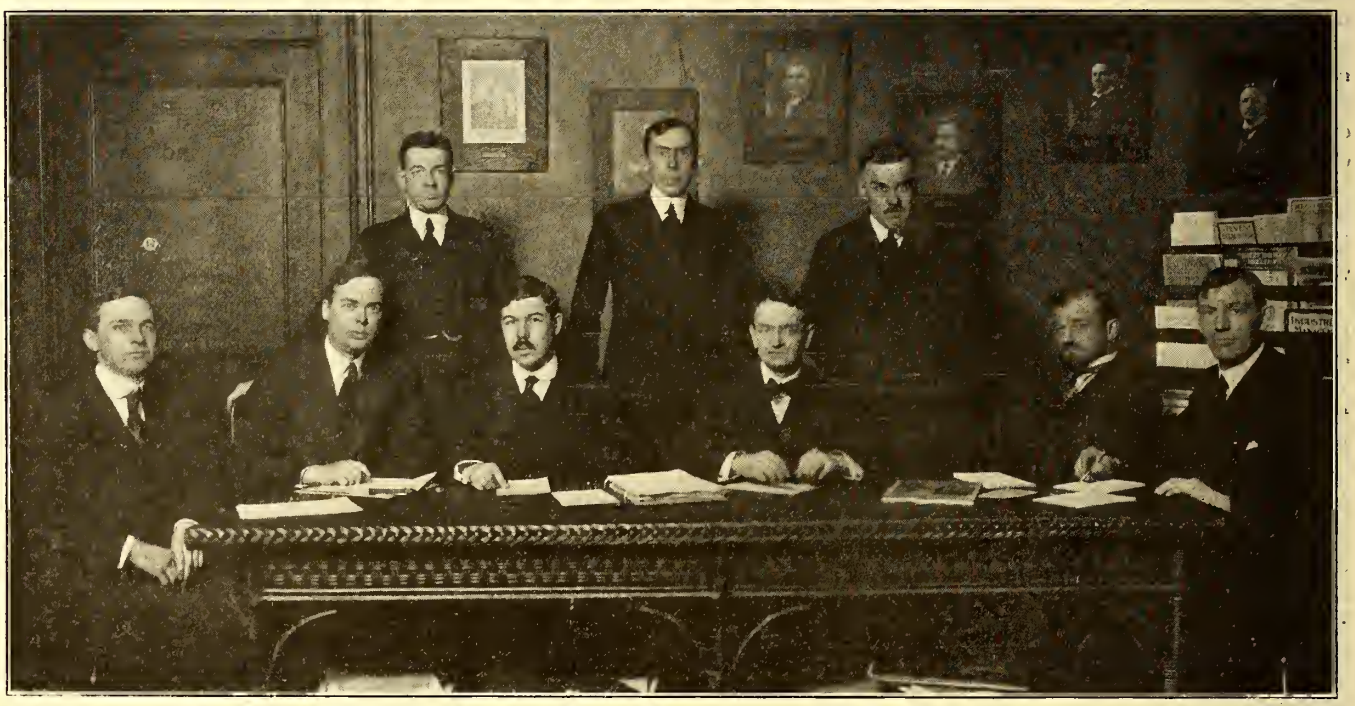
In 1916 the American committee printed a preliminary report for submission to its principals under the following general captions:

I. Principles and Definitions.
II. Methods of Making Electrolysis Surveys.
III. American Practice.
IV. European Practice.
V. Bibliography.

No effort was made to standardize practice or to agree on methods of mitigation.

After the preparation of this report and during the period of the war the committee was inactive. The Bureau of Standards also, except for making a few surveys, devoted all of its activities to military and naval problems for a period of two years or more, so that no material progress in electrolysis mitigation was made during this period.

It thus appears that at the present time, although



MEMBERS AND ALTERNATES OF RESEARCH SUB-COMMITTEE OF AMERICAN ELECTROLYSIS COMMITTEE IN CONFERENCE WITH ENGINEERS OF BUREAU OF STANDARDS

Standing Left to Right—V. B. Phillips, American Electric Railway Association; Burton McCollum, United States Bureau of Standards; Alexander Maxwell, National Electric Light Association.

Seated Left to Right—H. C. Sutton, American Gas Association, secretary; Elam Miller, American Telephone & Telegraph Company; L. A. Hazeltine, American Water Works Association; H. S. Warren, American Telephone & Telegraph Company, chairman; S. S. Wyer, Natural Gas Association; E. R. Shepard, Bureau of Standards.

Missing from Group—Philip Torchio, National Electric Light Association; L. P. Crecelius, American Electric Railway Association; E. E. Minor, American Water Works Association; E. B. Katté, American Railway Engineering Association.

much valuable research work has been done and the individual utility companies, working independently, have in many cities brought about greatly improved electrolysis conditions, there still remains much difference of opinion as to the applicability of the various methods of mitigation, and the conditions described in 1914 at the organization of this joint committee and which the committee was formed to correct are, in large measure, still prevalent.

Sub-Committee on Research Is Now at Work

In reviving activities a year ago, the American Committee on Electrolysis appointed a research sub-committee to engage actively in technical investigations in co-operation with the Bureau of Standards, for the purpose of securing needed information particularly on controversial questions.

The one subject more than any other upon which engineers have disagreed is pipe drainage. In spite of the wide application of this principle, there is much difference of opinion as to the extent to which it should be used. A number of questions such as, for example, joint electrolysis at high-resistance pipe joints, interchange of current between unequally drained systems, and gas explosions on heavily drained pipes can be settled only by comprehensive study in the field, in co-operation with the local pipe owning companies. The research sub-committee and the Bureau of Standards are accordingly attacking these problems and are receiving the cordial support of a number of water and gas companies. An investigation limited mainly to joint electrolysis has already been carried out in one city and valuable information obtained relating to joint electrolysis and interchange of current between different systems. Similar studies are to be made in a number of other cities and it is hoped that these will form the basis for substantial agreement on the whole subject of pipe drainage. Other methods of mitigation, including the three-wire method of power distribution and reduced feeding distances made possible by the use of automatic substations, will be studied with respect to their applicability under different conditions.

With the street railway and pipe-owning companies and the lead-cable interests all working together in harmony, assisted by the Bureau of Standards, a neutral body, conditions are most favorable for determining the facts relating to electrolysis. It is only by co-operation of this nature that complex problems involving the welfare of so many interests can be adequately dealt with. With this arrangement for co-operation it is not unreasonable to hope that ultimately the American Committee on Electrolysis will be able to report definitely on all methods of mitigation, describing the advantages and limitations of each, and so far as possible recommend suitable standards of practice.

Private Autos Cut Revenue 12 Per Cent

A COMMITTEE of the Massachusetts Legislature appointed to make a study of the cost of operation of motor buses and electric trolley cars has estimated that privately owned automobiles, exclusive of jitneys or motor buses operated for hire, have reduced the income of the traction lines in that State by 12 per cent. If this reduction should be applied to the whole country in proportion to the population the total reduction in electric car earnings would amount to $17,000,000 per year.

Hershey Cuban Railway Being Electrified

Steam Road Connecting Havana, Matanzas and Santa Cruz to Be Equipped for 1,200-Volt Operation, with Automatic Substations

By F. W. Peters
Railway & Traction Engineering Department, General Electric Company, Schenectady, N. Y.

HERSHEY Central, a beautifully situated town overlooking the Gulf of Mexico, is located on the north coast of Cuba practically midway between Havana and Matanzas, some 56 miles apart. The major activity here as well as at numerous other "centrals" on the island is the manufacture of sugar. The mill here is served by the Hershey Cuban Railway, having approximately 35 miles of single track, which is now being electrified and extended. With various extensions, short spurs and sidings, there will ultimately be 80 miles of electrified single track.

The service to be maintained will consist of cane and sugar transportation, besides through and local com-

MAP OF PART OF CUBA, SHOWING NEWLY ELECTRIFIED HERSHEY CUBAN RAILWAY

modity freight, express service and multiple-unit passenger train service operating on one-hour headway between Havana and Matanzas.

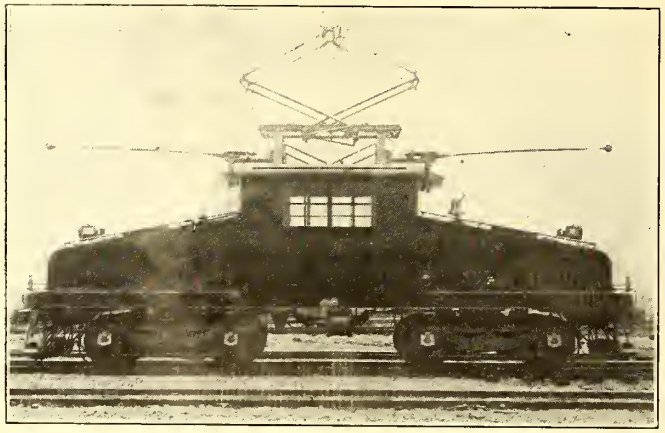
The 1,200-volt direct-current system will be used, with 10-point catenary trolley wire construction. The overhead will be suspended largely from bracket arms on creosoted pine poles, which will carry in addition the steel-cored aluminum transmission circuits and 795,000 circ.mil aluminum 1,200-volt feeders.

The freight motive power comprises seven 60-ton, four-motor locomotives designed to meet American standards, and the multiple-unit cars will be equipped to make a free running speed of 40 m.p.h. and will weigh about 29 tons. There will be ten straight passenger cars seating fifty persons, three combination passenger and baggage cars and two combination express and mail cars.

The power-generating and substation equipment will be as shown in the accompanying table. This equipment and the buildings in which it will be housed are of modern design and construction in every particular. An interesting thing about the power plant is that on account of the mild climate the boilers have been located out of doors, with only a roof over them for protection against the tropical rains. This affords agreeable work-

ing conditions for the men, and it insures minimum building cost and reduced operating expense, because the boilers are located adjacent to the sugar mill boilers and one boiler house organization can serve both.

The two outlying automatic substations, one of which is located near Havana and the other near Matanzas, are duplicates, each containing one 1,000-kw. group of synchronous converters, consisting of two 500-kw. 600-volt machines connected in series. A third 500-kw. 600-volt spare converter is provided with change-over switches, so that it may be conveniently substituted for either the high or low machine of the group.*



1,200-VOLT LOCOMOTIVE FOR HERSHEY CUBAN RAILWAY

POWER HOUSE AND SUBSTATION DATA—HERSHEY CUBAN RAILWAY

Generating Station	Number
2,500-kva. turbine alternators	3
35-kw. turbine exciter	1
50-kw. motor-generator exciters	1
600-hp. oil-fired steam boilers	4
3,000-kva. step-up transformer banks	2
300-kva. station auxiliary transformer banks	1
Switchboard	1
Spray pond	1
Main Railway Substation	
1,000-kw. 1,200-volt d.c. synchronous converter groups	2
1,050-kva. step-down converter transformer banks	2
Railway switchboard	1
Each of Two Outlying Automatic Substations	
1,000-kw. 1,200-volt d.c. synchronous converter groups	1
1,050-kva. step-down converter transformer banks	1
500-kw. 600-volt d.c. spare converter	1
350-kva. single-phase step-down spare transformer	1
Automatic control equipment	1

The switching equipment is completely automatic in operation and is similar to those which have proved successful in many parts of the United States.

The power transmission is 33,000-volt, three-phase, and provision is made for carrying two transmission circuits on a single line of poles between the power station and Matanzas. These will serve the railway substation on the Matanzas division as well as certain railway and commercial power applications in Matanzas.

On the Havana division immediate provision is made for carrying one three-phase transmission circuit to serve the Havana division railway substation and supply any commercial power demand along the right-of-way. Forty-five-foot creosoted poles of 150-ft. spacing have been used, and the pole line carries at the top a ¼-in. galvanized steel-strand ground wire and either one or two No. 0 steel-reinforced aluminum 33,000-volt three-phase transmission circuits, mounted on pin type insulators and creosoted wood cross-arms.

The contact wire is No. 0000 grooved trolley wire supported from a ⅜-in. galvanized steel-strand messenger, carried on pin type insulators with galvanized tee-iron and bracket-arms. On sidings and special work cross-span suspension is used.

Steel-terminal No. 0000 copper strand acetylene gas-weld rail bonds are used throughout.

To protect against the rapid deterioration of exposed ferrous metals, so prevalent in tropical countries, all iron parts employed in the transmission system are protected by hot-dipped galvanizing or sherardizing.

*A photograph of this rotary converter was reproduced on page 515 of the issue of this paper for March 13, 1920. It is the right-hand illustration. The captions for the two cuts at the bottom of page 515 should be interchanged.

French Cautious Regarding Inductive Interference

THE French technical papers have given much space recently to an article by J. B. Pomey, who was a member of the French Electrification Commission which visited the United States about a year ago. The article appeared originally in the issue of the *Annales des Postes, Télégraphes et Téléphones,* for December, 1919, p. 566. While this article covers the general observations of the author made during his visit to this country, it gives special attention to the inductive influence exerted by traction lines on communication circuits.

The principal point in this connection is that conditions in France and the United States are so different that it may not be practicable to apply directly the solutions of the inductive interference problems in France which have been successfully developed in the United States. As to inductive interference from direct current traction systems, he points out that while up to the present time the direct-current system has not interfered with the communication lines, it will not be wise to generalize too much as yet. More sensitive communication apparatus may be used in the future and, on the other hand, the volume of the current used in heavy electric traction will increase.

Mr. Pomey refers appreciatively to the use of the high-speed circuit breaker on the St. Paul electrification, which prevents the increase of short-circuit current to unmanageable values. He recommends that in the choice of a system of electrification for France the characteristic influences of the system upon the neighboring communication circuits be studied by means of the oscillograph. The effect of the operation of high-speed circuit breakers must be included in the study.

Costs Increase 75 Per Cent

THE report of the Committee of One Hundred of the Kansas City, Mo. Chamber of Commerce on the local traction situation shows that the local cost of service per revenue passenger carried has increased 75 per cent since 1915. The accompanying table shows the cost of carrying each passenger, as compared with the fare received, in each of the five years during which the present franchise has been in operation:

	1915	1916	1917	1918	1919	Per Cent Increase Over 1915
Operating ratio (per cent)	69.90	68.21	69.88	86.16	106.34	62.2
Unit rate of fare (cents)	5	5	5	5	6	20.0
Revenue passenger statistics:						
Average fare (cents)	4.87	4.97	4.97	4.98	5.81	19.3
Operating expenses and taxes (cents)	3.57	3.57	3.63	4.47	6.57	84.2
Fixed charges), cents.	1.16	0.97	1.08	1.20	1.72	48.1
Operating expenses, taxes and fixed charges (cents)	4.73	4.54	4.72	5.68	8.30	75.8
Profit or loss (cents)	0.14	0.43	0.25	*0.70	*2.49	....

* Loss.

Holding Down Load Peaks on the St. Paul

By Automatic and Manual Means a Load Factor of Nearly 60 Per Cent Is Obtained—Load-Totalizing Instruments Play an Important Part

BY J. J. LINEBAUGH
Railway & Traction Engineering Department, General Electric Company, Schenectady, N. Y.

THE power limiting and indicating system constitutes one of the many novel features developed and installed as part of the original equipment furnished by the General Electric Company to the Chicago, Milwaukee & St. Paul Railroad for the electrification of its Rocky Mountain and Missoula Divisions. The railway desired to obtain an equipment which, with heavy trains comparatively few in number, would give the highest load factor consistent with good railroading. The Montana Power Company, which furnishes power to this section of the railroad, desired to prevent excessive peaks, which might cause serious voltage variations which would require the installation of excess-generating apparatus to take care of the railway load. The power company desired also to obtain means by which the total power supplied to the railway transmission line at a number of points could be accurately recorded at one place and on one meter and to obtain proper peak-load data upon which to base the price of power.

The apparatus described below was built, installed and tried out on the 220-mile Rocky Mountain Division before similar equipment was supplied to the 220-mile Missoula Division.

The equipment for the Rocky Mountain Division as first installed was based on metering the power at the five feed-in points. It was later changed to meter the power at the low-tension side of the motor-generator set step-down transformers in each substation, in order that the high-tension transmission line of the railway company might be employed for emergency power transfer, by the power company. This was not necessary on the Missoula Division, with but two feed-in points.*

NINE FUNCTIONS OF THE CONTROL EQUIPMENT

All of the indicating and recording apparatus for both divisions is installed in the dispatcher's office at Deer Lodge, Mont., the center of the 440-mile electrification. The complete system comprises the distinct functions of limiting the maximum power demand at the will of the train dispatcher and of indicating and recording the total net power. The combination of these two functions accomplishes the following results:

1. Independent of the number of feed-in points, it indicates to the train dispatcher at all times the total net amount of energy being delivered to his division and it makes a permanent record for future study and as a basis for power bills.

2. It automatically deducts regenerated power if returned to the power company's lines or transfer of power from one line to another over the railway company's transmission line.

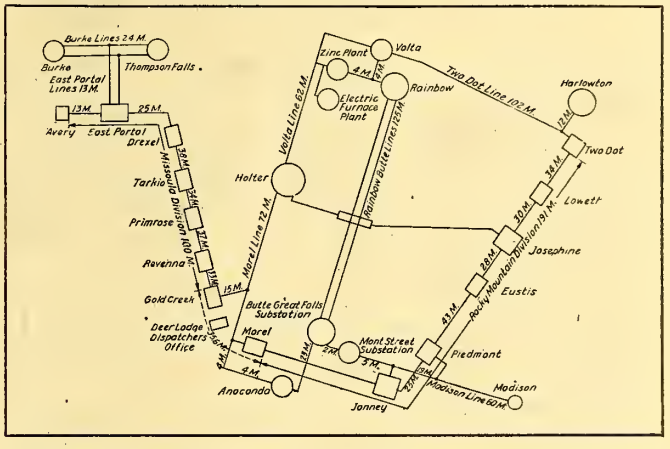
3. It automatically limits the amount of power supplied to the division by lowering the trolley voltage and slowing down the trains so that the maximum peak load on the system cannot exceed a certain predetermined maximum.

4. Its maximum limit can be changed instantly, easily, accurately and directly by the dispatcher without the necessity of notifying substation operators.

5. It is capable of reducing the peak-power demand by 30 per cent.

6. If desired, the equipment can be adjusted so that the lightly loaded substations will not be affected, thereby providing the highest possible voltage for the operation of passenger trains.

7. If desired, the equipment can be adjusted to reduce the voltage on the most heavily loaded substations at the time of peak demand (above the maximum limit)



CONNECTION DIAGRAM FOR ST. PAUL ELECTRIFICATION, ROCKY MOUNTAIN AND MISSOULA DIVISIONS

Showing connections of the 100,000-volt system of the Montana Power Co. and transmission lines of the railroad, with location of the 3,000-volt direct-current railway substations.

slightly in advance of the other stations, thereby tending to equalize the load on all the stations.

8. If an excessive demand for power occurs near any one substation the voltage of that substation is automatically lowered without affecting the voltage of the other substations, dividing the load between the substation affected and the stations on either side.

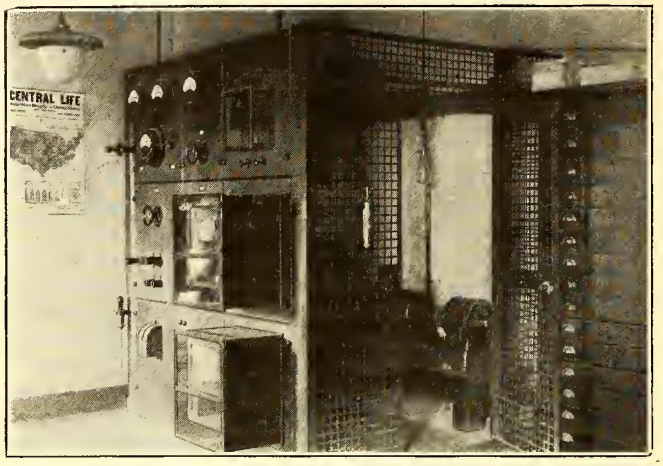
9. The total power fed in at any point or transferred from one power line to another or the amount returned due to regeneration can be easily taken care of by a change in the ratio of the current transformers or by an adjustment of the wattmeter rheostats.

CONTROL CIRCUIT A GIANT OHM-METER

The system is essentially an ohm-meter on a large scale, consisting of a two-wire pilot circuit, extending the length of the division, connecting in series all of the substations and the train dispatcher's office, with contact-making wattmeters and suitable rheostats at the incoming power points, and contact-making ammeters, with voltage-lowering generator rheostats in each substation.

*A brief reference to this system will be found in the abstract of the 1920 report of the committee on electricity of the American Railway Engineering Association in the issue of this paper for April 3, page 695.

A constant source of direct-current potential is applied across the two ends of the pilot wire loop at the dispatcher's office, power being obtained from a 2-kw. 1,200-volt direct-current motor-generator set, the voltage of which is held constant by a standard voltage regulator. The voltage applied to the pilot wire is determined by the length of the division, the resistance of



DISPATCHER'S OFFICE AT DEER LODGE, SHOWING POWER LIMITING AND INDICATING EQUIPMENT

the pilot wire, the number of substations and the power feed-in points.

The indicating and limiting feature is obtained by inserting or removing a certain number of ohms of resistance for a definite change in the kilowatt demand, which causes a definite decrease or increase in the current flowing in the circuit when a constant voltage is held across the pilot wire.

The contact-making wattmeter resistances and the pilot-wire contact-making ammeters are connected in series with the pilot wire, as shown in an accompanying diagram.

The apparatus is designed to hold certain definite peak limits in 2,000-kw. steps from 10,000 to 25,000 kw. as indicated.

The power-indicating apparatus in the dispatcher's office consists of a 2-kw. motor-generator set, a milliammeter calibrated in kilowatts, a curve-drawing ammeter, also calibrated in kilowatts; a curve drawing voltmeter, to give a permanent record of the pilot-wire voltage, and suitable indicating instruments and switchboard to control the motor-generator set.

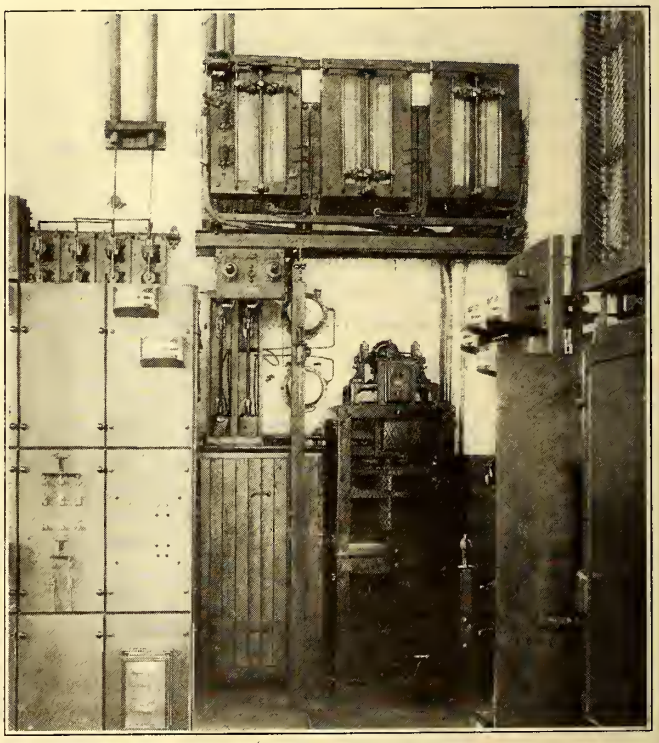
Due to the simplicity of the indicating wattmeters, two of these have been installed for each division, one on the switchboard and the other in front of the trick train dispatcher. With this arrangement the dispatcher can tell at a glance the exact amount of power being taken in his division at any instant, and also can watch the power demand resulting from his orders to the train crews in charge of trains ascending or descending the mountain grade.

Variation in resistance of the pilot wire due to change in temperature is taken care of in the dispatcher's office by a rheostat which can be easily inserted and the total resistance adjusted to 2,000 ohms (the approximate resistance of the pilot-wire loop and the coils of the contact-making ammeters), by holding 1,200 volts and adjusting the rheostat for 0.6 amp.

The contact-making wattmeter equipment consists of a contact-making wattmeter built along standard meter lines, with an indicating pointer equipped with contacts and moving between the two stationary contacts. The spiral spring of the pointer is connected to the shaft of the pilot-wire rheostat located immediately above the wattmeter. This shaft is driven by the motor-driven clutch mechanism at the top of the supporting framework. When contact is made on one side, due to an increase in incoming power, the circuit is completed through the clutch coils, causing the rheostat gearing to engage and inserting a certain amount of resistance in the pilot wire. At the same time the wattmeter spring is wound up due to the movement of the shaft. This action continues until the torque of the wattmeter is offset by the torque of the spring, when a balance is obtained and the clutch circuit is interrupted, thereby causing the rheostat to come to a standstill. This operation is continued for any increase or decrease in the incoming power.

How the Peaks Are Held Down

The power-limiting scheme in connection with the indicating equipment consists of a contact-making ammeter for each substation, with its coil connected in series with the pilot-wire circuit, so that when the current in the pilot wire decreases to a certain predetermined point contact is made and resistance is inserted in the exciter circuits supplying excitation to the separately excited direct-current generators by means of a motor-operated rheostat. The rheostats have sufficient resistance to lower the substation voltage to a minimum of 2,100. When contact is made by the contact-making



POWER LIMITING AND INDICATING EQUIPMENT INSTALLED IN JANNEY SUBSTATION, SHOWING PLUG-SWITCH PANEL

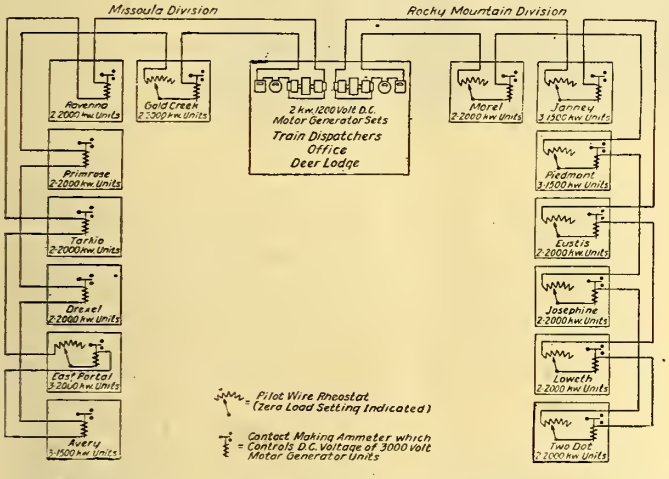
ammeter the voltage of the substation is decreased, and the resulting slowing down of the trains reduces the total input of the substation to a value below the predetermined peak setting. When the total load becomes less than the peak setting the contact-making ammeter will make contact on the other side and bring the voltage of the substation back to normal. A secondary current coil forms part of the contact-making ammeter and is

energized with current from a direct-current shunt in the ground or negative side of the 3,000-volt substation, so that the heavily loaded substations have their voltage decreased slightly before those with lighter loads.

If the total alternating-current input is beyond that covered by the power contract, or limit determined by the train dispatcher, the voltage of all of the substations will be decreased until the total input reaches the amount decided upon.

An overload and an underload relay are also connected across the current shunt. The latter is calibrated to make contact at about one-half load on a substation, so that the limiting equipment is inoperative until the load is greater than this amount. The overload relay is set to take control of the motor-operated rheostats at three times load and prevents the load going above this amount by lowering the voltage independently of the power-limiting equipment which transfers some of the load to the substations on either side.

If the power demand should be greater than the peak limit while a locomotive is regenerating through a sub-



CONNECTION DIAGRAM FOR THE PILOT-WIRE CIRCUIT AND LOCATION OF CONTACT-MAKING WATTMETERS

station the reverse-current relay in each substation (primarily used to give correct field connections of the synchronous motor exciters) is also arranged to open one of the control circuits so that the voltage-lowering rheostats are inoperative. With this arrangement the potential is held constant at 3,000 volts. If the voltage should be below normal, due to operation of the power-limiting equipment, and regeneration should occur, the voltage is automatically brought back to 3,000 and held at this value.

The maximum kilowatt peak limit, or kilowatt setting, can be changed at any time by the train dispatcher to take care of unusual congestion or other requirements.

Due to the necessity of reducing the pilot-wire current to the same value, the kilowatt totalizing meters, which are ammeters calibrated in kilowatts, must record correctly the total kilowatts, although finally carrying the same amperes. This is accomplished by gearing the several rheostats together with a common rheostat handwheel. This changes the voltage through the regulator by definite steps and also changes, at the same time, by definite increments the resistance across the coils of the two kilowatt meters, thus altering the current required to give any definite scale indication in the ratio of the change made at the same time in the pilot-wire voltage. By this means the current at which the contact-making ammeter makes contact can be made to represent 10,000 kw., 12,000 kw., etc., up to 20,000 kw., by simply turning the rheostat handwheel to definite points plainly marked, correctly connecting the three different circuits.

Load Factor Is Now Practically 60 Per Cent

The lowering of the trolley voltage in the substation is accomplished slowly enough, by proper speed of the motor-operated field rheostat, so as not to affect the operation objectionably, the only result being a gradual slowing down of the trains.

Additional power limiting is also obtained by instructing the freight engineers to drop back to series connection of the locomotive motors if very low trolley voltage is indicated by the voltmeters in each locomotive cab.

The peak limit was set at 14,000 kw. for the Rocky Mountain Division on April 1, 1919, and operation has been very satisfactory on this basis. The average load factor from April to September, 1919, inclusive, was 56.8 per cent.

The railway pays 0.536 cent per kilowatt-hour for 60 per cent of the peak, irrespective of whether this amount is actually used or not. The load factor maintained is so nearly 60 per cent that the increase in cost of power, or the cost of power not used, is very slight. With increase in the number of trains the load factor will be raised and no difficulty should be experienced in holding a load factor of 60 per cent or better. If the power-limiting feature is removed peaks as great as 21,000 kw. to 22,000 kw. would result.

One of the great indirect benefits obtained is the valuable assistance the indicating equipment gives the train dispatcher in dispatching trains in such a manner as not to give excessive peaks, and thereby lower the voltage due to the power-limiting equipment. By careful train dispatching, so that one train is ascending the mountain grade while another train is descending, it is possible to assist the automatic equipment in maintaining a good load factor very materially and greatly to increase the efficiency of the general operation of the railroad.

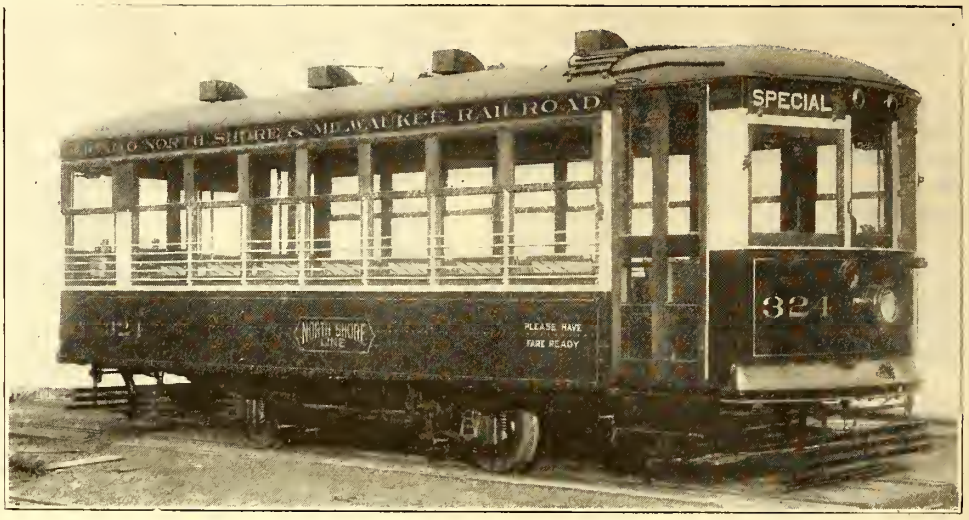
In the development of the apparatus described above great credit is due E. S. Johnson, J. R. Craighead, J. B. Taylor and E. J. Thiele for valuable suggestions, improvements and assistance in working out the details of the great number of new and untried features.

Kansas City Railway Installs Its Own Printing Plant

THE Kansas City (Mo.) Railways has installed a complete composition, printing and binding plant which is adequate to supply all of the company's printing needs except tickets and transfers. It is installed in a modern fireproof building with high ceilings and natural light and occupies 3,400 sq.ft. of floor space. The composing room is equipped with all sizes and faces of type and the necessary type cases, form stones, etc. The equipment of the press room includes a 35 x 47-in. bed Whitlock cylinder press for printing the weekly and monthly editions of the *Railwayan* and other large forms, a 12 x 18-in. Gordon press having a Miller automatic feeder and a 10 x 15-in. Gordon press for small forms. There is also a semi-automatic power paper cutter. The bindery is equipped with a wire stitching machine, a punching machine and a folding machine.

North Shore Line Adopts Safety Cars

Initial Installation of Ten Cars Shows an Increase in Gross Revenue as a Result of the Improved Service—Some Changes in Car Design Are Described



WAUKEGAN SAFETY CAR WITH NEW TYPE OF TRUCK

AN INITIAL installation of ten safety cars has been made in Waukegan, Ill., by the Chicago, North Shore & Milwaukee Railroad. This number is sufficient to equip the North Avenue line completely except for rush-hour service. This line runs from the Great Lakes Naval Training Station through North Chicago to the northern limits of Waukegan, a distance of nearly 6 miles. By the use of these safety cars the headway on this line has been reduced from fifteen minutes to eight minutes. The running time for a trip one way is thirty minutes, which is equivalent to a schedule speed of 11.56 m.p.h., not including lay-overs. The car mileage operated has been increased from 816 per day to 1,778. The safety car operators are paid a bonus of 10 cents per hour, bringing their total hourly rate up to 60 cents.

An interesting feature of this installation is that the safety cars operate over the through Chicago-Milwaukee interurban tracks for about one-half of the distance. They are thus sandwiched in among the local and limited interurban trains, express cars and freight trains. This operation over the interurban tracks necessitated the use of wheels with 4½-in. treads in order safely to negotiate the special track work and to operate the automatic crossing signals. Also, to meet the interurban requirements, the safety cars were equipped with whistles.

Another feature of the installation is that it embodies a change from two-man, pay-within operation to one-man, pay-as-you-enter operation, employing registering fare boxes. The increase of more than 100 per cent in service noted above has resulted. For the first fourteen days of March there was an increase of 35 per cent in the gross earnings, as compared with the corresponding period last year. Since the number of men at the Naval Training Station is materially less than it was a year ago, officials of the company attribute this increase in growth almost entirely to the better service and to the fact, also, that the pay-enter, fare-box collection has resulted in the men being able to get all of the fares.

The showing thus made after only about three weeks of operation gives rise to the evident probability that Britton I. Budd, president, will order additional safety cars in the near future in order to make the installation 100 per cent complete in Waukegan. As only two cars on a ten-minute headway are required for the Electric Park line, which is the other of the two lines in Waukegan, ten safety cars additional would provide the complete Waukegan service, both normal and rush-hour.

THE SAFETY CAR "SOLD" TO WAUKEGAN

The installation of the safety car in Waukegan was not made without considerable opposition. Speaking of this, Mr. Budd said that the city authorities, the trainmen, the newspapers, and seemingly everybody, were opposed to their introduction. In view of this attitude, Mr. Budd personally met with the trainmen and with the Mayor and other public officials and worked with them until he succeeded in either winning their support or at least a neutral attitude.

Mr. Budd simply endeavored to "sell" the idea of the cars. He showed the people that the local company had lost a considerable sum of money last year and that this meant either an increase in fare or a reduction in operating expenses. The safety car offered the opportunity to reduce operating expenses. Moreover, Mr. Budd promised a much improved service if the safety cars were permitted, the combination of better service and less expense per car-mile offering the possibility that the net earnings could be increased so that operation could be continued without an increase in fares.

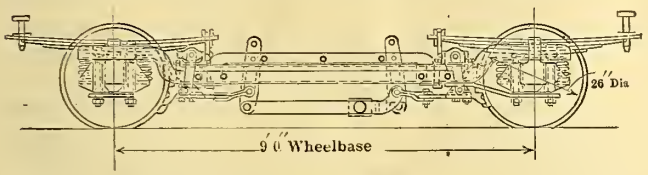
The trainmen were won over through Mr. Budd's efforts and the promise of 10 cents an hour additional pay.

When the cars were finally installed the greatest care

and an abundance of supervision were provided to make certain that there should be no bad first impressions. While some of the operators were a little slow the first day or two, the people in general were not only not dissatisfied, but were enthusiastic in their approval of the cars, and particularly of the noticeable improvement in the frequency and speed of the service.

MECHANICAL FEATURES OF THE CAR

The ten safety cars purchased by the North Shore Line were built by the Cincinnati Car Company and



SIDE ELEVATION OF SAFETY CAR TRUCK AS USED AT WAUKEGAN

mounted on that company's standard safety-car truck, the present design having been used also on the twenty-five safety cars recently shipped to the Birmingham Railway, Light & Power Company. These trucks have a 9-ft. wheelbase. Other details of their construction are shown in the accompanying elevation drawing. The car body is mounted on the outer ends of the semi-elliptic springs, without the use of any intermediary coil springs, as has been customary in other safety-car trucks. The opposite or inside ends of the elliptic springs are connected with the side frame of the truck through a swinging link, and the side-frame members rest on a pair of pedestal springs at either journal box. The substitution of the coil springs at the pedestals for the more usual coil springs at the outer ends of the elliptic spring was made for the reason that it is thereby possible to use a longer spring.

The wheels used on the North Shore cars are 26-in. rolled steel. The motors are the G.E. 264-A type with

HEAD LINING, SIDE SHEATHING AND DOUBLE FLOORING WERE USED IN THE WAUKEGAN SAFETY CARS

friction bearings. The truck journals are also of the friction-bearing type. All bearings in the brake rigging are steel bushed and all pins are case hardened. The brakeshoe and brake rigging wear is taken up by Gould slack adjusters.

The car body differs from the standard safety-car design in several respects. It is standard so far as dimensions and general construction go and as to the seating arrangement and the seating capacity of thirty-two. The underframe has been strengthened to conform to the requirements outlined by H. A. Johnson, superintendent of equipment of the Chicago Elevated Railways and Chicago North Shore & Milwaukee Railroad. Then inside the car, to provide for the cold weather which prevails on the shore of Lake Michigan at Waukegan, agasote sheathing and head lining was put in from the floor to the window sill or arm rest and again behind the advertising racks and over the ceiling. Further provision was made for cold weather through the generous use of electric heaters, each car being equipped with sixteen Consolidated Car Heating Company, No. 303, 500-watt trussplank heaters, which are controlled by a utility thermostat set at 60 deg. A double flooring of $\frac{13}{16}$-in. yellow pine with maple floor strips on top of this in the aisle was used.

Each car is also equipped with an International registering fare box, eight Railway Utility Company automatic ventilators, Golden Glow headlights, curtains doublefaced with pantasote, Economy watt-hour meters, H-B lifeguards, etc.

For coupling purposes a hole was provided down through the dash behind the bumper channel and a longitudinal hole cut through the web of the channel to admit the drawbar. The total weight of the car with this additional metal in the underframe, the inside finishing, etc., runs for the ten cars from 17,100 lb. to 17,400 lb., averaging 17,288 lb.

Letters to the Editors

Lack of Drainage, Shrinkage of Concrete and Difficulty of Repair Are Faults of Concrete Beam Track

DES MOINES CITY RAILWAY COMPANY
DES MOINES, IOWA, March 29, 1920.

To the Editors:

I have noted the article on page 609 of the March 20 ELECTRIC RAILWAY JOURNAL, describing a type of track construction in which the rails are supported on concrete stringers without the use of ties.

In studying this design it first occurs to me that the shaping of the subgrade would not only be difficult but also expensive. It would be impossible to roll it as is advisable in many classes of soil. The inefficiency of present day labor would certainly necessitate extremely close supervision and would result in slow and tedious work in order to secure an accurate cross-section, which must be exact both as to line and grade.

There is no provision for drainage which is so necessary in many soils. I have never actually tried out the concrete beam design, without the use of ties; nor have I had any experience in connection with concrete as a paving surface in tracks. It has been my understanding that these ideas have proved failures in places where they have been used, and I have tried to benefit by the experience of others in this respect.

The article does not describe in detail the method of

procedure during construction. It is assumed that the rails are blocked up and the plates, rods, hook bolts and all reinforcing are attached and bolted up, after which the concrete is poured. This would not permit any adjustment or tightening down of clips after first placing and the slight shrinkage of concrete might leave the rails a little loose.

My chief objection to absolutely rigid construction of any kind is, that while it will stay in good condition for a certain length of time, there will be a time when maintenance will be necessary in order to get maximum life out of the rails; and it is almost impossible to do any maintenance on this rigid construction and entire reconstruction is necessary. Where there is a cushion or parting strip between ties and foundation (whether the foundation is concrete or loose ballast) tracks can be overhauled and retamped, gaged or relined without as much expense as entire reconstruction. There is also the objection to rigid construction that it is noisy and harder on equipment.

The statement in this article that concrete presents a wearing surface "far superior to other types of pavement in connection with railway work" is, I am sure, misleading. Either granite block or good brick in my opinion will give better results. A hole in granite or brick pavement can be repaired and placed under traffic almost immediately, whereas with concrete, asphalt or any other surface cast in place, it is necessary to allow a certain length of time for the concrete to set or harden before traffic should be turned over it, and this is very hard to do when cars are in operation.

I believe we had better stick to the old plain rectangular foundation of some kind, continue to use a track tie and provide drainage for the sub-soil and probably more water proofing of paving surfaces to prevent frost from heaving the track in winter and water from churning in wet summer weather.

W. L. WILSON,
Chief Engineer M. of W. & S. Dept.

Book of Instructions for the Track Department

NEW YORK STATE RAILWAYS
ROCHESTER, N. Y., March 17, 1920.

To the Editors:

In the January 17, 1920, issue of the ELECTRIC RAILWAY JOURNAL the writer had an article giving formulas for the solution of compound curve problems and mentioned that these formulas were taken from a "book of instructions" originated by him for use of the engineering department of this railway. Because of the number of inquiries received concerning this book, a general description of form and contents is given here for those who are interested.

These instructions are typewritten on 8½ in. x 11 in. standard correspondence size paper and bound in a loose leaf cover. This size has been found to be the most convenient for all purposes, especially as most of the pages are typewritten and the drawings of the company are made in multiples of this size. For all typewritten pages onion skin paper is used and all typewritten work is backed up with carbon so it may be blueprinted. The book is made loose leaf because it is continually being revised and new matter added. It has not been published for the reason stated above and because much of the information deals with the particular methods and customs used only by this one company. A table of contents is given below showing the sections into which it is divided and the subjects covered under each section. These sections are separated by heavy manila separators having thumb indexes, upon which the subjects covered are printed.

TABLE OF CONTENTS OF BOOK OF INSTRUCTIONS FOR ENGINEERING DEPARTMENT

1. Track measurement—Detail instructions for chaining track for the track report and making up the same.
2. Special Work Renewals—
   1. Detail instructions for special work measurements.
   2. Standard dimensions of switches and mates.
   3. Instruction for special work data sheets (drawings for renewals).
   4. Instructions for ordering special work.
   5. Instructions for recording special work when placed.
   6. Tables of wheel tread data and minimum width of grooves (for special work manufacture).
   7. Special work specifications (for steel companies).
   8. Instructions for hard center and tongue renewals.
   9. Drawings showing method of planing rails, draining switches, etc.
3. Drafting—Gives full directions regarding standard sizes, titles, drawing numbers, conventional signs, etc.
4. Detail rules for filing, recording and indexing plans.
5. Estimating—Detail directions for getting out the company's standard estimates for authorizations explaining difference between additions, betterments, replacements and operating charges (according to N. Y. State P. S. C.) and a table of unit prices and quantities for 100 ft. of track.
6. Engineering data—
   1. Table of logs and middle ordinates for common standard radii.
   2. Table of rail sections in common use on lines.
   3. Compound curve formulas and special problems commonly met.
   4. Table giving drilling, size of holes, bolts, etc., for various kinds.
   5. Super-elevation charts.
   6. Drawings with complete details of company's standard specials.
   7. Loading diagrams of cars.
   8. Small printed maps of all car lines of system.
7. Specifications—All companies' standard forms of specifications and contracts, covering specifications for ties, paving and other materials, painting, building, crossings, licenses, etc.
8. Instructions for making the state tax report including unit prices and tables of depreciation for various constructions.
9. Instructions for Public Service Commission reports giving full details how each blank is filled out and where the information is obtained.
10. Instructions for making the company's annual statistical report.

This "book of instructions" is the outcome of several years' experience and the belief of the writer that written instructions are an important aid to efficiency in engineering as well as in other work.

L. R. BROWN,
Office and Field Engineer.

Pulverized Coal Under Boilers

GREEN ENGINEERING COMPANY
EAST CHICAGO, IND., April 2, 1920.

To the Editors:

In regard to the results obtained with powdered fuel in Milwaukee as outlined in the article by John Anderson on page 473 of the March 6 issue of ELECTRIC RAILWAY JOURNAL, the writer believes it is fundamentally wrong to take coal and prepare it to the most expensive condition (powder) and still burn it in its raw state, *i. e.*, with all its hydrocarbons. A much more fertile field of research and more rational procedure would be to extract some or all of the byproducts, leaving coke and gas for fuel. Ultimately we must come to some such process in this country, and until that time it will be difficult to find a complete analysis of figures that will show anything but a loss for powdered fuel as compared to stoker firing.

The ash carried out by the chimney gases is a serious matter. It is reported as high as 82.8 per cent of the ash content of the coal. This is an item that should not be lightly passed. It is not sufficient simply to state that it is "apparently carried a long distance" or that "no deposit could be noticed in the street." Some accurate way of measuring this discharge should be found before definite statements concerning it are made.

In figuring the cost of coal preparation only the equivalent fuel cost was charged, and that at the rate of 1.5 lb. of coal per kilowatt-hour. This figures 17,826 B.t.u. per kilowatt-hour. Few, if any, stations can assume such economy as this. The correct figure for cost of current should include all items—coal, labor, capital charges, in fact everything that goes to make up the ultimate cost of kilowatt-hour at the point of consumption. The author of the paper is misleading himself by using only partial costs for fuel preparation.

The cement industry has used powdered coal for twenty years and no doubt has much more data on the subject than steam producers. Such plants, with established cost figures, find that it costs in excess of $1 per ton to prepare the coal. If complete costs were figured for the Milwaukee installation, the cost of preparation would probably approach this figure and more than offset the alleged saving.

The stokers with which the comparison was made had a difference of 5.9 per cent between the gross and net efficiency. They were old and have auxiliaries costly to operate, reducing the gross or apparent efficiency to a net figure below that which can be obtained with other stokers. With modern chain-grate stokers, the net efficiency when operating at any such ratings as shown in this report is in excess of 76 per cent. Such a figure shows 5 per cent in favor of stoker firing over pulverized fuel.

From the author's presentation of the subject, the writer believes that the ash nuisance is unsolved and that in order to present even a slight saving in favor of pulverized coal it is necessary to: (a) Use low moisture coal. (b) Omit interest and depreciation on the additional investment. (c) Omit a large part of the cost of preparing the fuel. (d) Compare with underfeed stokers having low net efficiencies due to auxiliaries expensive to operate.

With these items corrected, the showing is in favor of stoker firing. T. A. MARSH, Chief Engineer.

Association News

Active Membership Campaign Planned

THE company membership committee of the American Electric Railway Association will make an extensive campaign for a 100 per cent enrollment of all electric railway companies in the United States this summer. This was the action taken at a meeting of the committee in Toledo on March 30. Each member of the committee will be allotted two or three states and will be empowered to select an assistant and visit personally every company in his district. The committee members were unanimous in the desirability of binding the electric railways into the association at this time when all other factors are organizing. Secretary E. B. Burritt, New York, was present. Others who attended the meeting were L. E. Gould, Chicago; J. P. Barnes, Schenectady, N. Y.; C. A. Hall, Pottsville, Pa.; E. B. Moore, Fairmount, W. Va., and J. W. Welsh, New York. The committee members were guests of President Frank R. Coates of the Toledo Railways & Light Company. They took lunch at the Toledo Club and dined at the Minority Prophets' Club, where Mr. Doherty was also present. In the afternoon they were taken on a tour to the Willys-Overland plant, one of the largest users of electric current in the Middle West. The committee has already begun work, two new members having been secured since the meeting by Mr. Barnes.

Committee for Chamber of Commerce Meeting

SECRETARY BURRITT announced this week the names of the alternate delegates of the association to the meeting of the United States Chamber of Commerce at Atlantic City on April 27-29. The list of delegates and alternates follows:

National councillor and delegate: L. S. Storrs; alternate, Britton I. Budd.

Delegates: J. N. Shannahan, W. A. Draper, P. J. Kealy, B. A. Hegeman, Jr., Charles L. Henry.

Alternates: C. M. Clark, James H. Drew, C. C. Peirce, E. C. Faber, E. B. Meissner, M. B. Lambert, H. W. Blake.

Secretary Burritt is anxious to learn of any members of the electric railway industry who expect to attend the meeting as representatives of their local Chamber or Board of Trade. A gathering of railway men in attendance will probably be arranged to discuss any matters of interest to the industry which may arise.

The preliminary program for the transportation section of the meeting is printed on page 771 of this issue. No special public utility section meetings are scheduled this year, the electric railways being included in the transportation group.

Coming Committee Meetings

THE committee on merchandising transportation of the Transportation & Traffic Association will hold a meeting in New York on April 12.

The committee on way matters of the Engineering Association is to meet in New York on April 15-16.

The committee on express and freight traffic facilities and cost of the Transportation & Traffic Association will meet in New York on April 26.

The committee on heavy electric traction of the Engineering Association is to meet in New York on April 28.

A meeting of the equipment committee of the Engineering Association is scheduled for May 7. It will be held in New York City.

Convention Location Committee

H. FORT FLOWERS finds that it will be impracticable for him to serve upon the American Association convention location committee. William F. Hurlburt, sales manager of the Metal & Thermit Corporation, has been appointed in his place.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

City Ownership Rejected

Wisconsin City Votes Three to One After Tart Campaign Not to Take Over Railway

Municipal ownership has been rejected in Madison, Wis. The voters of that city on April 6 turned down three to one the proposal to have the city purchase the lines of the Madison Railways. The company through paid newspaper advertising led the opposition to the purchase. Labor organizations and labor members in the Common Council led in the fight to buy the lines. It is expected that the City Council will now vote to co-operate with the railway and permit the installation of one-man cars on all lines.

Seven Years of Uncertainty

The railway question has been before the people of Madison for seven years. The municipal ownership advocates based their fight on the ground that the company could not make the necessary extensions and provide better service without raising the fares. Since November, 1918, the rate in Madison has been 6 cents. Opponents of the plan pointed to the fact that the Madison Railways purchased "a streak of rust" and converted it into railway; that with reasonable co-operation on the part of Madison citizens the company could build extensions and continue to improve the service.

Two investigations of the service and finances of the Madison Railways were completed recently. One was conducted by a committee of citizens and Aldermen named by Mayor George C. Sayle; the other was conducted by the Wisconsin Railroad Commission.

The citizens-Council committee reported to the Council that with city co-operation in the matter of paving and the installation of one-man cars on all lines the company could continue on a 6-cent fare, build extensions and provide better equipment and service. The Railroad Commission reported to the effect that service could not be improved until practically the entire system was double-tracked, more rolling stock provided and cars operated under closer supervision.

Spirited Campaign Conducted

In the campaign against municipal ownership it was pointed out that should the citizens vote to purchase the lines, it would mean at least two years before the city could take up actual operation, because after the Railroad Commission had fixed a valuation on the property, the matter would probably be carried to the Circuit Court and thence to the Wisconsin Supreme Court. This would mean two years in which no improvements would be made by the railway. On the other hand, it was stated that should municipal ownership be defeated, the city would then take up the matter of putting into effect the recommendations of the citizens-Council committee.

Under a city ordinance, passed in the days of horse cars and still operative, the railway at Madison is forced to pay for paving between its rails. The city now has paving claims of nearly $50,000 against the company, with much more paving in prospect this year. In its report to the Council, the committee urged that the present debt of the company to the city be arranged for payment in annual instalments. Future costs would be met in the same manner, under the committee's plan.

With permission from the Railroad Commission and the City Council, the company has been operating five rebuilt one-man cars. The committee urged that these be replaced by one-man safety cars. The company is building a 2½-mile extension on the Winnebago line to the plant of the Mayer Packing Company at a cost of $40,000. This money was raised by public subscription through the efforts of the Association of Commerce, contributors to the fund receiving preferred stock on which dividends will be deferred for five years. This was made necessary by the refusal of the Mayer company to consider locating at Madison until the railway was extended to the plant.

One-Man Cars Protested

Employees of certain electric railways in New Jersey have asked the Board of Public Utility Commissioners for a hearing on their application in protest against the operation of the one-man cars. In a reply Alfred N. Barber, secretary of the board, points out that the commission cannot compel a company to stop operating such cars in the absence of public complaint and evidence showing their operation to be against the public interest. As the question of the safety of the service is one which concerns the employees of the company it would be the duty of the board to entertain the complaint of the men and afford them a hearing.

The one-man cars are operated by the Trenton & Mercer County Traction Company, Trenton, N. J., and the Morris County Traction Company, Morristown, N. J., and so far no complaint has been made against them. Rankin Johnson, president of the former company, says that it is not the intention of his company to cause a loss of work to any of its employees because of the installation of the cars.

Assist in Track Renewals

New State Law Provides That City Can Do Work and Company Repay in Ten Instalments

Through an amendment to the general code known as Senate Bill No. 211 the General Assembly of the State of Ohio has made it possible for a municipality to finance the renewal, repair or reconstruction of the track of a street railway at the time the street is paved, the cost being subsequently assessed against the company in ten equal annual instalments plus 6 per cent interest. It is understood that the Pennsylvania-Ohio Electric Company, Youngstown, will spend $500,000 on reconstruction this year on this plan.

Governor Signed Bill Promptly

The bill recently signed by Governor Cox provides that a City Council may by ordinance order a street railway to renew, replace or reconstruct its track and roadbed at the time the street is torn up for paving or resurfacing. If a company is dissatisfied with the ordinance provision is made that within ten days after its passage it may file a complaint or appeal to the Public Utilities Commission. The commission is thereafter charged with the duty of hearing and determining the case within thirty days, either approving, modifying, or reversing the action of the local Council. If the railway then fails to notify the local Council in writing that it will do the indicated construction work directed by the commission, or if without appeal, by the City Council, then it is provided that the Council itself may by ordinance contract for such renewal or reconstruction of the track and roadbed. In this case, it is understood that the railway may bid on the work and secure the contract on a competitive basis.

Paving Charge a Lien

The code provides that the Council shall by ordinance assess the entire cost of the labor and material required for the work against the railway, and upon failure of the latter to pay the assessment in cash it becomes a lien upon all of the property of the company located within the city. This assessing ordinance must provide for the payment of the assessments in ten equal annual instalments with interest until paid at not to exceed 6 per cent per annum; provided, however, that the company shall not be liable for any instalment of the assessment falling due after the expiration of the company's franchise unless the use of the track is continued thereafter by the company.

Municipal Ownership Approved in Detroit

City Decides to Go Into Railway Business for Itself in Competition with Detroit United Railway

Mayor Couzens' plan for the construction and acquisition of street-car lines by the city was approved by the voters of Detroit, Mich., on April 6, by a majority vote of about 64 per cent. A majority of 60 per cent was necessary to carry the election. Contrary to expectations, only about 140,000 votes were cast out of a registration of more than 330,000 voters, owing probably to the bad weather. The election makes possible the Detroit Municipal Railway, to be owned and operated by the people of Detroit through their elected representatives in competition with the Detroit United Railway.

The proceeds of the $15,000,000 bond issue which has been approved will be used in financing the construction of 101 miles of new tracks and in equipping that trackage with 400 new motor cars and 150 new trailers, as well as the taking over of 55.5 miles of lines 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, one on Fort Street and one on Woodward Avenue.

As soon as Mayor Couzens was assured that the vote had been decided in favor of his plan, he appeared before the City Council and asked approval of a tentative arrangement to start immediately on the construction of the first line. This the Council granted and included the issuance of $100,000 in public utility bonds.

"Construction" Has Started

Arrangements were made with a local contractor, a permit issued by the Department of Public Works and on the day after the election digging was started for the foundation of the municipal line. Work was begun at Charlevoix Street and Connors Road on the so-called Mack-Myrtle belt line, with the intention of working eastward along Charlevoix Street to the city limits.

In a proclamation to the people, the Mayor states that the people of Detroit have won the greatest victory in the city's history in the approval of the bond issue, and have reaped the fruits of their courageous fight for the past twenty-five years. Under the whip of determined competition, the Mayor states, the Detroit United Railway must now furnish the service it has so long denied the people. The people are thanked by the Mayor for their approval of his plan and complimented for their stability and sound reason.

In studying the returns by wards the fact is revealed that the Couzens plan received the heaviest majorities in the outlying sections, where the residents have gone into the open country hoping that car service would some day be extended into their localities.

The way was paved for the present action when, in 1913, a proposed amendment to the city charter was adopted, providing for the creation of a street railway commission which was to acquire a railway.

In November, 1915, a vote was cast on the proposal to purchase the city properties of the Detroit United Railway at a price to be determined by the Wayne County Circuit Judges. This plan was defeated, it being generally conceded that the main objection of the voters was the fact that no fixed purchase price was named.

The last purchase plan voted on was in 1919, when Mayor Couzens submitted a proposal to take over the Detroit United Railway lines and equipment at a price agreed upon by the railway and the commission, but this was voted down by the people as the price named was believed to be far in excess of the value of the system.

To Mayor Couzens, who did not approve of the Tayler service-at-cost plan, there appeared to be no other recourse but to submit the plan of building a city system and taking over the lines which have been operated by the Detroit United Railway on the day-to-day agreement.

Taking over the Fort Street and Woodward Avenue lines, where franchises have expired, will not be attempted by the Mayor at this time. In consequence the present traffic arrangements will not be disturbed until the city is ready to provide cars and other equipment necessary to operate the lines.

No official statement has been issued by the Detroit United Railway as to what action will be taken next by the company. It is generally believed that further action on the proposed extension ordinance initiated by the Detroit United Railway will be deferred.

Toledo Strike Has Been Settled

New Wage Agreement Signed Immediately After Court Order—Higher Fares Already in Effect

Service was resumed on the railway lines of the Toledo Railways & Light Company, Toledo, Ohio, on April 7 by order of Federal Judge John M. Killits, after a four-day strike, started when the Council refused to grant a fare raise necessary to increase wages. The wage agreements were signed immediately after the order of the court had been entered and the new schedule of higher fares has gone into effect. The judge promised an "open court" investigation to determine "a compensatory return" for the company, which, according to company statistics, will mean a larger increase in fares. Fares are now 7 cents, with 2 cents for a transfer and three tickets for 20 cents.

The strike in Toledo was due to the failure of the City Council to ratify a strike settlement which involved a fare increase. The cars have been in operation only three months since the famous "ouster" ordinance removed them to Michigan for a month.

An improvised bus system was attempted to take care of the transportation needs of the city. The Council regulated the buses by placing them under a city transportation commissioner. The day fare was limited to 10 cents and owl service to 25 cents.

Wage Request Started New Dispute

After the "ouster" fiasco the cars were brought back to Toledo under the joint protection of the federal court and a city ordinance postponing the "ouster" till May 1. Meanwhile two commissions appointed by the federal court have been busy framing both cost-of-service and municipal ownership ordinances for a permanent settlement of the quarter-century traction fight in Toledo.

The new dispute, which caused a suspension of service, was injected into the traction tangle when car men and electrical workers demanded a wage increase of nearly 40 per cent effective on April 1. The electrical workers received a compromise increase and continued at work.

The conductors and motormen went on strike because the company was unable to meet their demands without an increase of fares. The representatives of the trainmen, the Mayor and officials of the company agreed that the men were entitled to a raise from 42, 44 and 46 cents an hour to 54, 56 and 60 cents. They also secured the advice of accountants to the effect that it was necessary to provide additional revenue to the company for such an increase. The scheme agreed upon by the conference was for a 7-cent fare, 2-cent transfer and three tickets for 20 cents. With this increase it was shown that company revenue would be reduced by $60,000 from what it was last year.

By the adverse vote of six Councilmen the measure ratifying the increases failed to be brought out of committee and at the second meeting of Council the whole railway question was ignored.

The 10-cent fare loomed after the refusal of Council to grant an increase from "6 and 2" to "7 and 2." Henry L. Doherty immediately dispatched the following letter to the Mayor:

We wish respectfully to notify you that all of the propositions heretofore made by us to prevent a suspension of car service were automatically annulled when they were rejected by a vote of the Council.

Our earnings at present are far below

that necessary to yield a fair return, and our representations that we are making still further sacrifices to prevent a suspension of car service have been verified by your investigators.

We must be released from further obligation under any offers we have heretofore made and be free to insist upon a scale of fares which will yield a compensatory return.

Mr. Doherty declared after sending the letter that he did not have a definite policy in mind for future negotiations. He left that to the citizens and the Council. He said he was determined to be bound by no good efforts of the past after "gratuitous insults" had been handed the company for its sacrifices in trying to effect a settlement.

The transportation system was badly tied up by the Easter snowstorm. Very few buses of any kind were running and only a few had registered.

The Toledo, Ottawa Beach & Northern and the Maumee Valley lines were also tied up by the strike. They are both Doherty lines and are operated by members of the same unions to which the city men belong. Other interurbans continued to operate into the city. This fact made the present strike less severe upon merchants than did the absolute ousting of all cars.

Almost coincident with the strike came the date for the filing of company objections to the cost-of-service plan drafted by the federal commission headed by W. L. Milner. A new ordinance embodying the changes which would make the original ordinance acceptable to the company was sent to the commissioners through Federal Judge Killits on April 3. Along with the ordinance went a forty-eight page typewritten copy of argument taking up the Milner ordinance in detail.

Features of New Measure

Among the outstanding provisions in the new draft upon which the commission is now working are these:

1. Scale of fares omits any maximum as foreign to the cost-plus idea.
2. A return of 8 per cent is asked on the stock rather than 7 per cent, with the bond return remaining at 6 per cent.
3. Elimination of the sliding scale of return on stock which provided a reward for efficient and economical operation.
4. No initial rate of fare is stated.
5. The company provides that the whole system of tracks and equipment shall be taken rather than any particular parts the city may desire to purchase in event the people decide for public ownership.
6. No property of the company beyond the city limits is included in the new ordinance.
7. The forfeiture clause of the city charter is included, but provision is made that the company is not bound by it if it should at any time be declared unconstitutional.
8. The Acme Power Company is eliminated as a party to the contract. The Acme company is a Doherty power plant which merely manufactures power and sells to the Toledo Railways & Light Company.
9. The depreciation fund is changed in name to betterment fund and its functions are outlined more clearly, as being for the purpose of maintaining the capital value at the fixed mark.
10. Lease of lines by the city must be approved by referendum and be upon six months' notice to the company.
11. The company is required to raise $1,900,000 within ninety days after the grant is accepted; $1,000,000 is for new lines and rerouting, $500,000 for the betterment fund, $400,000 for the stabilizing fund.
12. Regulations for contracts with interurbans are changed, giving company reciprocal rights with interurban as to examination of books and arbitration regulations.

The commission will attempt to work over the two drafts into an acceptable one so that a referendum vote may be taken about the middle of June.

The advocates of municipal ownership plan have not yet submitted an ordinance. They have asked Mr. Doherty for a cash price.

Hydro Commission Takes Over Border Lines

Detroit United Canadian Lines Taken Over by Cities After Unfortunate Experiences

The Sandwich, Windsor & Amherstburg Railway, a subsidiary of the Detroit United Railway, serving Windsor and seven other border municipalities in Canada, became the Border Cities Railway on April 1 when it was taken over by the Ontario Hydro-Electric Power Commission, culminating negotiations that have been pending for some time. The transfer was made without ceremony. The first car out of the carhouse in the morning was in charge of the newly appointed manager and the only apparent evidence of the change in service was the presence of the new tickets issued by the commission.

Arthur McGill, former engineer and assistant superintendent of the Niagara, St. Catharines & Toronto Railway, has been appointed by Sir Adam Beck, chairman of the commission, to fill the position of general manager of the lines, which will now be operated by the commission.

Howard Brooker has been appointed superintendent of the border municipal lines. He was dispatcher of the Niagara, St. Catharines & Toronto Railway.

Agitation for the taking over of the lines by the municipalities was begun by the Windsor Council members in 1918, but at that time the commission could not entertain the project. Negotiations between the officials of the railway and Sir Adam Beck were started early in 1919.

With these negotiations pending, matters came to a climax last May when the employees on the Sandwich, Windsor & Amherstburg Railway asked for increased wages. The company maintained that the increase could not be granted without a higher rate of fare, a straight 5-cent fare with a 1-cent charge for transfer being asked to replace the six-for-a-quarter fares with free transfers. The men sought to enforce their demands by a strike. This strike lasted about two weeks. It was ended by a compromise, after the railway had made an unsuccessful attempt to resume service by the aid of strike breakers, an attempt which resulted in the necessity for calling troops to maintain order.

The Ontario Railway and Municipal Board was called upon to decide the matter of fares and wages and the board, acting upon the findings of the auditors who examined the financial status of the company, recommended the wage increase demanded by the men and the 5-cent fare asked by the company.

At the election on July 5 a proposed by-law allowing the fare increase was defeated by a large majority of Windsor and Walkerville voters, and another strike resulted immediately.

The Railway Board was asked to take charge of the situation. The company was notified to resume service and when it failed to do so the board seized the lines. A settlement was soon effected and the supervision of the lines was turned back to the company, results of an audit previously made by the Railway Board having shown that the company could afford to pay its men a reasonable increase.

Large Majority for Public Ownership

On Dec. 6, 1919, a special election in the border district resulted in a large majority in favor of the Hydro-Electric Commission's plan to purchase the lines and equipment and improve the system at a total cost of $2,100,000, approximately one-third less than the company first asked. To finance the purchase, the commission was authorized to issue forty-year bonds guaranteed by the municipalities served by the lines. All expenses, both original cost and maintenance charges, will be met by the earnings of the lines and paid by the riders.

The electric light and power plant was taken over by the city of Windsor for $190,000, and will be operated as at present, using steam furnished by the Canadian Salt Company. This power will be used by the Hydro Commission to operate the cars and furnish light and power in Windsor until replaced by power from the Niagara development at Chippewa Falls.

Municipalities Plan Extensions

The present plans call for an extension inland from the Detroit River to supply the rapidly growing district with service. Thirty new steel cars of the one-man type have been ordered. New equipment is being counted upon by border residents inasmuch as it has been claimed that no repairs or replacements were made by the Detroit United Railway since the vote to take over the lines, with the result that many of the cars are now dangerous to ride in.

No increase in the six-for-a-quarter fare is contemplated. The commission's new tickets are sold on that same basis.

Better service is promised and at the same time a warning is sounded that too much cannot be expected until new equipment can be installed, new tracks laid and schedules rearranged.

Rapid Transit Plan Muddled

Opposition Appears to Be Developing Fast to Cleveland Plan as Now Proposed

Little progress was made toward the organization of a boosting committee to take part in the campaign for the rapid transit or subway bond issue at Cleveland, Ohio, when the second meeting of business and civic organizations was held in Mayor Harry L. Davis' office on April 5. The Civic League presented a report in which it objected to the construction of a subway at this time, but the indications are that a number of other organizations will support the movement, although none of them was ready to report at this time.

C. OF C. FAVORS PROJECT

Inasmuch as the original movement in favor of subways under the Public Square came from the public utilities committee of the Chamber of Commerce, Attorney A. A. Stearns, chairman of this committee, expressed the opinion that a majority of the members will favor the plan. The committee's report was scheduled for completion on April 8. In speaking of the suggestion that economy would dictate a delay in the construction of the subway, Mr. Stearns said that this alternative might prove the worst kind of economy in the end.

The recommendations made by the Civic League are as follows:

1. That the present subway proposal be voted down.
2. That the Rapid Transit Commission join with other civic bodies in having legislation passed which will make possible a metropolitan taxing area for financing future rapid transit development.
3. That the city attempt to relieve congestion without abnormal expenditure of public money: (a) That the City Council take immediate steps to reduce vehicular congestion by passing such traffic regulations as will clear the streets for moving vehicles, particularly in rush periods. (b) That further study be given to the question of rerouting cars in the public square.
4. That the City Planning Commission's proposals for our street difficulties be adequately studied and understood before we undertake other methods of relief.
5. That if none of these alternatives proves adequate to relieve congestion, and, after recommendation No. 2 has borne fruit, that the Rapid Transit Commission present to the voters of the whole district the simple question of a through rapid transit system between the East and West Sides.

The second recommendation is to the effect that the suburban towns be required to pay a portion of the cost of the proposed improvement. The fifth is based upon this condition, but limits the service to an east and west line, which would not be of any advantage to some of the outlying corporations and of little use to others. Unless the subway system can be arranged to accommodate all portions of the city, it would hardly be supported by a majority of the voters.

CIVIC LEAGUE OBJECTS

One of the principal objections made by the Civic League, aside from the money consideration, is that the subway does not provide rapid transit. Apparently, the organization does not want to install the improvement by degrees, relieving congestion in all directions, but would prefer a finished road along one line first, others to follow as they may.

Instead of making the Public Square a terminal for all cars, the report suggests:

1. Looping back of many more cars during rush periods as suggested in the report of the engineers.
2. More cars and therefore less crowding.
3. A new routing on the Public Square loops.
4. Elimination of some of the downtown stops.

Other plans suggested for the elimination of congestion are:

1. No-parking rule in the rush hour in the downtown district, and in other congested areas such as Euclid Avenue and East Fifty-fifth Street and East 105th Street, and at East Fifty-fifth Street and St. Clair Avenue.
2. One-way streets when and where necessary.
3. Good pavement for radiating streets such as Prospect, Woodland and St. Clair Avenues, S. E., and Superior, to divert vehicular traffic bound for suburbs.
4. Progress on the opening of Carnegie Avenue, S. E., and Chester Avenue, N. E., downtown.
5. Early construction of the Huron-Lorain bridge. This, according to the engineer's report, will divert a considerable proportion of east and west vehicular and street car traffic from the Public Square.

Boston Men Will Present New Wage Schedule

At the meeting of the union held in Boston, Mass., on March 24 it was voted to raise the schedule of rates for motormen and conductors on the Boston Elevated Railway from 50 cents an hour minimum rate to 73½ cents an hour and from 60 cents an hour, the present maximum rate, to 95 cents an hour.

This schedule, adopted without dissent, is to be presented to the trustees of the Boston Elevated Railway for consideration at an early date to go into effect as soon as possible at the expiration of the present agreement. This latter expires on April 30.

The new schedule, if approved by the trustees, would increase the annual payroll from $7,725,000 to $12,225,000, not taking into account any increase for other classes of labor employed on the system.

The presentation of a sliding rate in reality has no appreciable effect on the total proposed increase as practically all the motormen and conductors now in the employ of the company have been connected with the Boston elevated system long enough to receive the benefit of the maximum rate. Hence the advance from 60 cents to 95 cents an hour would affect the majority of the motormen and conductors and would amount to asking for an increase in rates of more than 50 per cent.

The prospect of wiping out the deficit of $752,342 from the operation of the system under the present arrangements, which appeared very probable by July 1, disappears in view of this new demand on the part of the union.

Ohio Men Demand Increase

Trainmen on Four Roads Present Scales Which in One Case Aggregate 100 Per Cent Rise

Platform employees of a number of electric railways in Ohio are demanding material increases in wages. In most cases, if these demands are granted, an increase in the rate of fare will be necessary to cover them. This means complications, similar to that in Toledo, where the men struck on April 2 because the City Council refused an increase of fare that would enable the railway to pay wages demanded by the men.

CLEVELAND MEN WANT 90 CENTS

In Cleveland the officers of the local union announced on March 31 that the men had voted unanimously to demand 90 cents an hour. This rate would apply to all, experienced and inexperienced alike. The new Cleveland rate demanded is an increase of 50 per cent over the highest rate in the present schedule, which is graded from 55 cents to 60 cents. In addition to the increased wage, the men demand time and one-half for all time over eight hours a day. A minimum of eight hours is thus demanded to replace the present minimum of five hours. The men further want a rearrangement of schedules to permit 60 per cent of the runs to be completed in eight hours, 30 per cent in ten hours and 10 per cent in twelve and one-half hours.

About two-thirds of the operating employees now work ten hours or more, the other third, consisting of trippers largely, working shorter time. If the demand is granted the company's payroll would be increased between 55 and 70 per cent, according to one of the officials, and it would probably be necessary to increase the rate of fare from 5 cents to 6 cents.

At Youngstown Mayor Fred Wornock offered his services as mediator when the Ohio-Pennsylvania Electric Company and its platform men disagreed on a new wage scale. He thereby prevented a strike planned for March 31. The men are demanding 70, 73 and 75 cents an hour. The company offered to pay 60, 63 and 65 cents. The present scale is 40, 43 and 45 cents. A conference with the union is awaited.

AKRON MEN WANT 80 CENTS

Platform employees of the Northern Ohio Traction & Light Company on the local lines at Akron are asking for a wage of 80 cents an hour, with an eight-hour day and pay for ten hours. Negotiations will be taken up within a few days, it was announced by union officials. It is said that employees at Canton are also asking for increased wages.

It is reported that employees of the Cleveland, Southwestern & Columbus Railway at Elyria are preparing to ask for a new wage scale, with $1 an hour as the maximum. The present scale is 42, 46 and 50 cents.

Bills Introduced in New York

A Summary Is Presented of Important Recent Bills, Except the Service-at-Cost Measures

Among the bills affecting the electric railways introduced in the New York State Legislature recently are the following:

Senate Intro. No. 913, Print No. 1019. Introduced March 9, by G. F. Thompson. Amending section 178 railroad law by providing that street surface railroad companies shall keep in permanent repair that part of streets 6 in. in width on each side of rails instead of all the space between its tracks and 2 ft. outside as at present required.

Senate Intro. No. 991, Print No. 1116. Introduced March 11 by Mr. Gibbs. Amending section 66 public service commissions law by providing for suspension of rates of gas and electric corporations for a period not longer than 120 days pending determination by the Public Service Commission.

Assembly Intro. No. 1056, Print No. 1176. Introduced March 9 by Mr. Amos. Adding new section 27-a public service commissions law by providing that no corporation shall charge for transportation of passengers a rate of fare in excess of that specified in its charter, such rate to be a maximum rate until the corporation applies to public service commission for permission to increase same. The commission is empowered to allow such increase provided it is fair and reasonable and in the public interest. The act takes effect Sept. 1, 1919, the date on which the Government control measure becomes inoperative.

Senate Intro. No. 1150, Print No. 1321. Introduced March 18 by Mr. Marshall. Amending section 239 banking law, relative to investment by savings banks in bonds of street railroad companies.

Assembly Intro. No. 1268, Print No. 1431. Introduced March 15 by Mr. Bloomfield. Amending section 47 public service commissions law, by providing that the first district commission shall report not less than one and the second district commission not less than two accident inspectors, whose salaries shall be fixed by the commission.

Assembly Intro. No. 1313, Print No. 1515. Introduced March 17 by Mr. Healey. Requiring the giving of transfers by surface railroads whose tracks run in southerly or northerly direction for a continuous trip on intersecting lines in Manhattan and Bronx, New York City.

Assembly Intro. No. 1338, Print No. 1540. Introduced March 17 by Mr. Soule. Amending section 53-a railroad law, by placing the jurisdiction of the location and character of crossing signs under the Public Service Commission and striking out the present arbitrary language of the section.

Assembly Intro. No. 1439, Print No. 1660. Introduced March 19 by Mr. Trahan. Adding new section 63-a railroad law by requiring an additional motorman on electric trains of two or more cars.

Assembly Intro. No. 1441, Print No. 1662. Introduced March 19 by Mr. Webb, enacting the public service contract law, to be chapter 72 Consolidated Laws, providing for service contracts of employment between public utilities corporations and their employees and for the enforcement thereof. Such contracts are to be filed in the office of the Public Service Commission. There is provision for a fund for payment of fines imposed on corporations or employees. The Public Service Commission is to appoint boards of award to adjudicate claims arising under service contracts. Service of a public utility is not to be interrupted. There are provisions for injunctions and damages.

Senate Intro. No. 1464, Print No. 1721. Introduced April 1 by Mr. Lynch. Amending sections 242 and 595 greater New York charter, relative to design, construction, purchase and operation of omnibuses in New York City. The comptroller with the approval of the board of estimate and apportionment, is authorized to issue special revenue bonds to meet expenses of maintenance and operation during 1920 of municipal omnibuses.

Assembly Intro. No. 1613, Print No. 1935. Introduced March 31 by Mr. Martin. Amending section 240 village law by permitting lighting contracts at an expense not exceeding 5 mills instead of 2½ mills as at present on every dollar of taxable property.

Assembly Intro. No. 1593, Print No. 1915. Introduced March 31 by Mr. Amos. Amending section 20 transportation corporations law, relative to incorporation of stage coach companies by increasing from five to nine the maximum number of directors.

Suggests Service at Cost for Indianapolis

The Public Service Commission of Indiana on March 30 called a conference of the officials of the Indianapolis Street Railway and of the city of Indianapolis for the purpose of considering the establishment of a "service-at-cost" plan of railway operation. It is hoped by this means to place the company on a sounder financial basis, enable it to earn sufficient revenue to pay a fair return on invested capital and establish credit to provide sufficient funds for the purchase of additional cars and equipment.

The officers of the railway expressed their favor of such a plan. The Corporation Counsel of the city of Indianapolis stated that in the past the city had taken the position that the Public Service Commission did not have jurisdiction over the local company, but that the courts had decided otherwise. He said that if the company was entitled to relief when the commission issued the 5-cent fare order, it certainly was entitled to relief now, as prices have not declined (as was anticipated by the commission when the order was issued over a year ago) and the emergency still exists. In speaking for the city, he said it was essential the company obtain more cars to keep pace with the city's growth.

E. I. Lewis, chairman of the commission, remarked that during the last two years there has been a marked change in the attitude of the public and the city toward the company.

Pittsburgh Men Want Still More

The motormen and conductors of the Pittsburgh (Pa.) Railways on March 29 presented demands to the receivers of the company for a wage increase of 70 to 75 per cent, an eight-hour day and time and a half for overtime, effective on May 1. The wage demands are: First three months' service, 86 cents an hour; nine months' service, 89 cents an hour, and, after the first year's service, 91 cents an hour. At the maximum rate and under the eight-hour day platform men, after one year's experience, would receive $7.28 a day. Under the existing agreement, in which the rates were fixed by the National War Labor Board, the men received 49, 52 and 54 cents an hour.

Announcement was made on April 6 that negotiations between the receivers of the Pittsburgh Railways and the trainmen would not begin until the week commencing April 11. The present wage scale of the trainmen calls for a maximum of 57 cents an hour.

The receivers issued a statement in which they deny that an increase is contemplated in the present fare of 10 cents cash or 7½ cents when buying disks. The Public Service Commission has just handed down its long awaited decision in which it holds that the present fare is legal.

The receivers say they are not making a great amount of money now, but that the increase in fare several months ago has given them sufficient revenue to keep going under the present overhead and general expenses.

On April 1 a voluntary increase of 10 per cent for all its hourly men, announced some time ago by the receivers, went into effect, making motormen's and conductors' wages 54, 57 and 60 cents an hour, but the new demands are 60 per cent, about 31 or 32 cents an hour, higher than these. The eight-hour day would succeed the present working day, which averages nine hours.

Hearing April 13 on Service-at-Cost Measure

There is to be a public hearing on April 13 before the judiciary committee of the Assembly on the following measures:

Assembly Print No. 1961, entitled: "An act to authorize cities and incorporated villages and towns of the state to enter into agreements with street surface and rapid transit railroad corporations for transportation upon a service-at-cost plan and empowering the public service commissions, in certain cases, to order temporary or permanent changes in the rates, fares and charges of such corporations."

Assembly Print No. 1962, entitled: "An act to amend the public service commissions law, in relation to liability for violations of chapter."

Assembly Print No. 1963, entitled: "An act to amend the public service commissions law, in relation to transportation rates, fares or charges."

These three measures were introduced on April 1 by Assemblyman Edmund B. Jenks of Broome County and are companion bills covering the service-at-cost plan of operating street surface railroads. It is the consensus of opinion that the measures have more than an ordinary show of passage, especially as the judiciary committee of the Assembly voluntarily set the date for the hearing on the measures. The bills have not as yet been introduced in the Senate, but if the action of the Assembly on them be favorable there is little doubt of their passage.

The opposition to the measures is expected to come principally from those members who are opposed to conferring upon the Public Service Commission arbitrary franchise-giving powers now vested in the Legislature itself as a constitutional right and from those members of the Legislature who are fearful that the immediate result of the passage of the bills would be to raise the rate of fare paid in New York City. It is anticipated that the hearing on the bills will be largely attended. Already the interest in the bills has caused the printed supply to become exhausted, but it is hoped to have additional copies printed in time for the hearing.

Receiver Seeks $2,000,000 for Reconstruction

Rolla Wells, receiver of the United Railways, St. Louis, Mo., is seeking permission to spend $2,000,000 for the purchase of about 160 new cars, $917,380 for track reconstruction within the city and $140,200 for track reconstruction on the St. Charles line in St. Louis County. A hearing on the merits of the application of the receiver for permission to make these expenditures was begun on March 30 by Special Master Henry Lamm. Albert T. Perkins, manager for the receiver, stated that he desired to rebuild about 31 miles of city tracks. Henry S. Priest said that some track reconstruction was necessary, but that in view of the present high prices only such work should be done as was absolutely essential. He and Richard McCulloch, president of the company, had fixed 25 miles as the amount of reconstruction to be carried forward at this time. It was planned to do this work gradually.

Anti-Strike Bill in Massachusetts

A bill to prevent strikes on the electric railways in Massachusetts now owned or controlled by the State is before the Legislature. The measure is identical with the recommendations of the special committee on street railways brought before the special session last November. Briefly it provides for continuity of service on all publicly owned or controlled lines, making it unlawful for any agents, officers or persons in the service of the companies to prevent the continuous operation of the lines.

The bill further provides for the arbitration of differences of opinion or disputes regarding compensation, hours of labor or working hours and proposes the establishment of a board for this purpose.

The penalty for violation of the provisions of the bill is discharge from the service of the company in which the violator works and the prevention of re-employment of the offender by the railway company for a period of one year.

Carhouse and Cars Destroyed

Fire destroyed the storage carhouse of the International Railway, Buffalo, N. Y., in the Riverway, Niagara Falls, N. Y., on March 21 with a loss of eight passenger cars, three snowplows and a sweeper. The loss is estimated at $60,000. The cars were of an old type and were used during the rush hour periods on the local lines. The storage carhouse was formerly a roller skating rink. It adjoined the Riverway terminal of the Niagara Falls interurban lines. The main terminal was not damaged by the fire. The company proposes to enlarge the terminal by erecting a new building on the site of the storage sheds that were burned.

News Notes

Jitney Regulatory Bill Passed.—The bill giving the Board of Public Utility Commissioners jurisdiction over the jitneys in New Jersey has been passed by the Legislature.

Retroactive Pay Award—Employees of the Western New York & Pennsylvania Traction Company, Olean, N. Y., have been granted a wage increase retroactive to Oct. 18, the date when the lines of the system were tied up by a general strike. The men will receive an advance of 5 cents an hour, making the new scale from 32 to 38 cents an hour.

I. T. S. Not Seriously Damaged.—The property of the Illinois Traction System, Peoria, Ill., was not seriously damaged by the recent hurricane. A total of 150 poles was blown over by the high winds of March 25 and trains were delayed from three to five hours during the day and the following night. The worst breaks were north of Lincoln, Ill.

May Change Its Voltage.—The British Columbia Electric Railway, Vancouver, B. C., is thinking of changing the voltage on the Fraser Valley line from 600 to 1,200 volts to help get freight trains over the grade. The lengthening of freight sidings is also contemplated in order to take care of the long trains which are now being handled on the line.

Wage Hearings Postponed.—Action on the demands of the employees of the New York State Railways, Rochester, N. Y., for increases in wages has been postponed. A meeting is scheduled for the week commencing April 11. As explained in the ELECTRIC RAILWAY JOURNAL for April 3, page 720, the men are seeking an advance of 100 per cent.

Wages Raised by West Penn Company.—A wage increase of approximately 10 per cent has been granted by the West Penn Railways, Pittsburgh, Pa., to all trainmen and shopmen, effective immediately. About 600 men are affected. The advance makes the rate for trainmen 55, 58 and 60 cents an hour, the top figure being paid to employees after one year's continuous service. The old rate was 50, 53 and 55 cents an hour.

Worcester Men Want More.—The carmen's union of the Worcester (Mass.) Consolidated Street Railway have presented to Clark V. Wood, president of the company, a demand for an eight-hour day for all conductors and motormen, a 40-per cent increase in wages for all miscellaneous employees and $6.40 for an eight-hour day for all uniformed men operating two-men cars and 15 cents an hour above the regular schedule for all men operating one-man cars. They call for $5.20 a day for beginners for the first three months of service and $5.30 a day for the remaining nine months of the first year, pay thereafter to be $6.40. The employees of the Springfield (Mass.) Street Railway have presented similar demands to the officials of that road. Their present contract with the company will expire on June 1.

Programs of Meetings

Arkansas Utilities Association

The convention of the Arkansas Utilities Association will be held at the Arlington Hotel, Hot Springs, Ark., on April 26, 27 and 28.

Central Electric Railway Accountants' Association

The next meeting of the Central Electric Railway Accountants' Association will be held at the Lincoln Hotel, Indianapolis, Ind., on April 24.

National Safety Council

The Spring conference of the Engineering Section of the National Safety Council is to be held at the Engineering Societies Building in New York City on April 27. The morning session will first take up the relationship of safety and engineering efficiency—the question whether, apart from its human values, safe operation of a factory or a railroad is in truth inseparably connected with efficient operation. The afternoon session will be devoted to safety standards: first, the present movement for uniform standards; second, the National Safety Council's part in this movement.

Chamber of Commerce of the United States

The main topic to be considered at the eighth annual meeting of the Chamber of Commerce of the United States, to be held in Atlantic City April 27-29, is "Increased Production." The delegates will consider this topic from six points of view, namely, the relation to increased production of government, transportation, international finance, research and efficiency, immigration and Russia's part. In addition, there will be group meetings of various industries. The program of the transportation meetings is as follows:

Tuesday afternoon, April 27: Report of committee on railroads, George A. Post, chairman; "Railroad Consolidation," by John E. Oldham of Boston; "Car Supply and Car Service," by Charles E. Lee, Ford, Bacon & Davis, New York.

Wednesday morning, April 28: "Transportation in Relation to Production," (a) "Railroads," by George A. Post, and one other speaker, probably a member of the Senate or House committee on railroads; (b) "Merchant Marine."

Financial and Corporate

Reorganization Terms Stated

Committee Representing Security Holders Gives Details of Security Exchange Following Wheeling Sale

A reorganization plan has been announced for the West Virginia Traction & Electric Company, Wheeling, W. Va., the property of which was sold recently under foreclosure as noted previously in the ELECTRIC RAILWAY JOURNAL.

TWO NEW COMPANIES

It is proposed by the committee in charge of the reorganization to create two new companies. One of these companies will be known as the Wheeling Company. To it will be transferred the Wheeling-Elm Grove properties subject to existing underlying liens. The other company will be known as the Morgantown Company. To it will be transferred the Morgantown properties subject to the Union Utilities lien, under which bonds of $874,000 are outstanding. There will also be transferred to the Morgantown Company the stock of the Wheeling Company and all the two-year notes represented by the committee, together with all of the outstanding bonds of the old company, the deficiency claims, etc.

The proposed Morgantown Company will be organized with a total authorized common capital stock of $1,000,000, of which the present issue will be $500,000. No dividend is to be paid on this stock for two years and the net income for that period is to be carried to surplus. Moreover, not more than one-half the sum which subsequently becomes available for dividends is to be paid as such. The balance is to be carried to surplus with protective provisions for maintenance and depreciation.

There will also be a total authorized issue of $1,500,000 of 7 per cent cumulative preferred stock by this company. Of this amount $862,733 is to be issued at present. The cumulative preferred stock is to have equal voting power, share for share, with the common stock. It is to be preferred both as to dividends and assets and is to be redeemable at the option of the company, all or in part, from time to time at 105 and dividend.

DETAILS OF SECURITY EXCHANGE

Ahead of both issues of stock will come an authorized issue of $5,000,000 for fifteen-year 6 per cent general mortgage bonds. Of this issue $1,136,400 will be issued at this time. These general mortgage bonds will constitute a second lien upon the Morgantown properties and a first lien upon the stock of the Wheeling Company. The securities received by the committee will be distributed as follows:

1. To the committee for the account of the noteholders in the sum of $1,800,000 face value: (a) Bonds in 60 per cent of face of defaulted notes, $1,080,000; (b) preferred stock, 40 per cent of face of defaulted notes, $720,000; (c) preferred stock for interest at 6 per cent of the defaulted notes from May 1, 1919, to Jan. 1, 1920, $72,000.

Upon consummation of the plans, therefore, the holders of the notes deposited will receive for each $1,000 note, $600 in bonds and $400 in preferred stock of the new company, with $40 of additional preferred stock for account of the accrued interest from May 1, 1919, to Jan. 1, 1920.

2. To holders of the outstanding $94,000 of bonds of the West Virginia Traction & Electric Company. (a) Bonds in 60 per cent of face value of bonds of the old company, $56,400; (b) preferred stock in 40 per cent of face of bonds of the old company, $37,600; (c) preferred stock for interest on bonds of the old company from May 1, 1919, to Jan. 1, 1920, $3,133.

(3) To bankers in consideration for $30,000 in cash, for underwriting $10,000 of the new securities, for the loan of $40,000 to the committee, for the assignment of $591,098 of proved claims in the receivership representing cash advances to the owners of the company: (a) preferred stock, $30,000; (b) common stock, $500,000.

DIVIDENDS LIKELY FROM START

The receiver estimates that the operating income of the Morgantown property alone for the year 1920 after providing for normal maintenance, but before reserve for the depreciation and after deducting from earnings all expenses for new drillings will be well over twice the interest on the bonds of the new company and the outstanding bonds of the Union Utilities Company, and that, after paying interest charges on these bonds, the balance will be approximately three times the sum required to pay dividends on the preferred stock. It is probable that the company will be able to begin paying dividends on its preferred stock at once. These estimates the committee deems to be reliable, but it does not guarantee their correctness.

$1,500,000 for Chicago

The city of Chicago will receive nearly $1,500,000 as its share of the earnings of the local railways for last year. This is more than two and a half times the city's share for the previous year. Under the contract ordinance by which the city gets 55 per cent of the net earnings of the companies $1,005,259 will be derived from the Chicago Railways and $443,588 from the Chicago City Railway.

Municipal Line Going Behind

San Francisco Has a Deficit or Not, Depending Upon the Shade of Observer's Glasses

The San Francisco (Cal.) Municipal Railway has reported for January. Actually the road is making money; theoretically it is losing money. Or theoretically the road is making money; actually it is losing money. It all depends. Those who favor municipal ownership see the matter one way; those who oppose it see the matter another. The receipts for January were $229,030. The expenditures were $180,711. Thus the excess of receipts over expenditures appears to be $48,319. But against this amount of $48,319 there remain to be charged up depreciation of $40,974, or 18 per cent of the gross passenger revenue, interest of $19,458 on outstanding debts and $2,410 for injury insurance. Thus the apparent surplus of $48,319 becomes a deficit of $14,524.

Supervisor Ralph McLeran, chairman of the finance committee, says the idea of increasing fares has not been discussed seriously. He is quoted as follows:

> The lines are being operated at a profit. The gain is in the 18 per cent depreciation fund, which takes care of all the deficits in the operations fund and leaves a surplus besides. It is claimed by some that 18 per cent is excessive, but from what we have gathered it is not advisable to change the method at this time. It will not be long before the city is taking other traction arteries and then other methods of maintaining the funds may be decided upon.

Paving Very Burdensome

Setting forth several paving projects in Atlanta, Ga., this year that will cost the Georgia Railway & Power Company more than $200,000, the current issue of *Two Bells*, published by the company for general distribution, explains one of the principal items of overhead expense the company, or any other railway, has to contend with. It shows very clearly why it is so difficult to develop railway service into a paying proposition.

Under the charter of the city of Atlanta the company is assessed for a width of 16 ft. on all paving or repaving done where it has double tracks and 11 ft. where it has single tracks. This assessment is, in reality, a forced contribution, the company points out, because every kind of a vehicle uses the streets. During the recent strike the public was impressed by the great volume of the traffic.

The repaving of Juniper Street recently cost the company $25,204. This single item required 420,077 6-cent fares to pay for it, and this is but one small item of the paving expense the company is required to meet. On this particular assessment the company petitioned the Railroad Commission for authority to pay it one-fourth cash and the rest on promissory notes because of the company's financial condition. Furthermore the company has asked the same privilege in paying future assessments for paving or repaving.

Milwaukee Income Increases

Income Statement Indicates Property in Fair Financial Condition—Bulk of Revenue from Railway

The recently issued annual report of the Milwaukee Electric Railway & Light Company for the year ended Dec. 31, 1919, shows operating revenues of $14,888,446, an increase over 1918 of $2,878,175, or 23.96 per cent. The railway department earned $8,273,989, or 56.6 per cent of this amount. Operating expenses, including taxes and reserves, amounted to $11,552,374, an increase of $1,987,751, or 20.78 per cent, leaving $3,336,072 as the net operating revenue. Non-operating revenues were $145,539. Interest charges, including interest on depreciation reserve balances, totaled $2,016,343, leaving a net income for the year of $1,421,269. Gross income available for payment of interest and dividends was $3,481,612.

In February, 1919, the Milwaukee Electric Railway & Light Company acquired and now operates the property of the Milwaukee Light, Heat & Traction Company, comprising an extensive system of suburban and interurban railways within a radius of about fifty miles of Milwaukee, the local railway system in Racine and the electric power transmission and distribution system throughout the territory served by the suburban and interurban railway lines.

The earnings and expenses of the Milwaukee Electric Railway & Light Company as reported above for the year 1919 accordingly include those of the property formerly owned by the Milwaukee Light, Heat & Traction Company. For the purposes of comparison the earnings and expenses of both companies for the year 1918 have been combined.

The operating revenue of the railway utility was $1,669,650, or 25.28 per cent, more than during 1918. This is attributed partly to the effect of the discontinuance on June 1, 1918, of the sale of reduced rate tickets in the single fare area and an increase effective on Nov. 2, 1919, in the fare in the Milwaukee single fare area and partly to increased zone fares on the suburban and interurban lines which became effective in July, 1918, and on Nov. 2, 1919. The traffic has increased to a marked extent. Expenditures during the year for additions, extensions and betterment to the plants and systems of the railway amounted to $289,086, equivalent to 20.5 per cent of the total of $1,4410,384 for property additions.

Four quarterly dividends, each of 1.5 per cent, were declared during the year on the $4,500,000 of outstanding preferred stock. In the railway department 25.6 per cent of the operating revenues was appropriated for maintenance and depreciation. Any balance of this appropriation remaining after providing for maintenance was carried to the credit of the depreciation reserve, which at the close of the year amounted to $3,595,781.

Following the statement by the company of its inability to meet the request of its trainmen for an increase in wages and earn a fair return on the capital invested in its railway utility property, an investigation was undertaken upon request of the company by the Board of Conciliation appointed under a new Wisconsin law. The findings of the Board of Conciliation disclosed the necessity of an increase in the trainmen's wages. These findings, under which the trainmen were awarded an increase of nine cents per hour, were referred to the Railroad Commission of Wisconsin. The commission issued an order increasing the rate of cash fare in the single fare area from 5 cents to 7 cents and providing for the sale of tickets at six for 35 cents and eighteen tickets for $1, and directed the company to thereupon make effective the increase in wages awarded by the Board of Conciliation. The order of the commission affecting both wages and fares became effective on Nov. 2, 1919.

The accompanying tables pertain entirely to the operation of the railway department and indicate that the recent fare increases have had a marked effect on increasing the revenues from transportation.

MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY
(Railway Operations Only)

Income Statement		1919	1918	Per Cent Change + Inc—Dec.
Revenue from transportation		$8,041,458	$6,436,169	+ 24.10
Revenue from other railway operations		232,531	177,358	+ 31.10
Total railway operating revenue		$8,273,989	$6,613,527	+25.20
Maintenance and depreciation appropriation (25.76 per cent. operating revenue)		2,125,000	(a)	.....
Additions to property		$289,086	(a)	.....
Roadway and track	$185,044			
Revenue cars	13,680			
Elec. eq. of rev. cars and locomotives	768			
Railway utility equipment	19,004			
Miscellaneous utility equipment	31,935			
Other expenditures	38,655			

(a) Not shown in report.

STATISTICAL STATEMENT OF MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

Owned and leased:	1919	1918	Per Cent Change + Inc.—Dec.
Total mileage	403.45	403.79	+ 0.083
Average total miles operated	381.05	380.26	+ 0.207
Car-miles (active)	20,681,252	20,014,231	+ 3.33
Car-hours (revenue)	2,165,972	2,140,300	+ 1.20
Ratio car-miles to car-hours (per cent)	9.56	9.41	+ 1.59
Revenue passengers	146,208,335	129,240,334	+ 13.10
Transfer passengers	51,287,831	46,560,391	+ 10.17
Total Passengers	197,496,166	175,800,725	+ 12,32
Ratio transfer to revenue passengers (per cent)	35.08	36.03	
Gross passenger revenue	$8,041,458	$6,436,169	+ 24.95
Average fare:			
Per revenue passengers (cents)	5.50	4.98	+ 10.42
Per total passengers (cents)	4.07	3.66	+ 11.22
Car-mile statistics:			
Operating revenue (cents)	40.01	33.00	+ 21.22
Passenger traffic (total)	9.12	8.82	+ 10.95
Car hour statistics:			
Operating revenue	3.83	3.09	+ 23.62
Passenger traffic (total)	95.4	87.80	+ 8.77
Mileage statistics:			
Gross passenger revenue per mile of track operated	$21,100	$16,910	+ 24.75

Fort Scott Road Scrapped

The railway portion of the property of the Fort Scott Gas & Electric Company, Fort Scott, Kan., about 9 miles, has been abandoned and dismantled and the rails are being torn up. The other divisions are to be continued as the Fort Scott Public Utilities Company.

The troubles of the railway at Fort Scott date back to 1918. Early in that year receivership proceedings started. Even that early the railway in Fort Scott sought relief from municipal restrictions as a way out. Conferences looking toward that end were arranged, but proved unavailing. In April of that year the company reported operation had been discontinued.

Operating Managers for Ohio Electric Railway

Day & Zimmerman, Philadelphia, Pa., have taken over the Ohio Electric Railway, Springfield, Ohio, as operating managers. They will conduct the property in the interest of Drexel & Company, Philadelphia, and the bondholders' protective committee. Interest is understood to be in default on certain bonds of the company secured with the bankers by pledge of stock as collateral. Rather than foreclose, the bankers enter the active management of the company, through Day & Zimmerman, in complete understanding with W. Kesley Schoepf, president of the company, and the interests which he represents.

F. A. Healy, secretary and treasurer of the Ohio Electric Railway, attributes the present unsatisfactory financial condition of the company to the increased cost of operating the road in comparison with increases in revenue. This, he said, is due to the high cost of labor, the taxes which the company is forced to pay on its holdings and the vast amount of paving which the railway has been forced to do.

$6,000,000 Equipment Trust Proposed

In submitting the ordinance giving approval of City Council to the issuance of $6,000,000 of equipment trust certificates by the Philadelphia (Pa.) Rapid Transit Company, W. C. Dunbar, vice-president of the company, stated that the notes would bear interest at the rate of 6 per cent per annum, maturing in equal semi-annual instalments during a period of not more than ten years and secured by the lease of 1,500 surface and 97 elevated-subway cars. Mr. Dunbar said:

> This proposed equipment trust certificate issue is required to finance immediate necessities and supply increased car carrying capacity. The financing of new lines and extensions is planned to be accomplished by the formation of new companies issuing first mortgage bonds to cover the cost of construction, to be guaranteed by P. R. T., which company will also be the sole owner of such nominal issue of capital stock as may be required. Plans for the issuance and sales of these bonds will be presented from time to time, for your approval.

It is pointed out in the letter that the sum of $2,400,000 is urgently required to meet immediate necessities, covering reconstruction of 20 miles of track, power plant and sub-station improvements; modernizing 700 cars, and for additional shop facilities.

Demand Made for Forfeiture of Charters

Arguments in the quo warranto proceedings brought by David I. McCahill, Pittsburgh, Pa., for forfeiture of the charters of twenty-one district electric light and power companies in Beaver, Lawrence and Butler Counties are being heard by Attorney-General William I. Shaffer of Pennsylvania. The companies are held by the Mahoning & Shenango Railway & Light Company, the Pennsylvania Power Company, the New Castle Electric Company and the Zelienople Electric Company.

It is contended by Mr. McCahill that none of the companies has started construction work or made effort to show existence as operating concerns during two years following incorporation. Plans of works of competing companies are being gone over and efforts being made to establish physical existence of the companies involved. Among those who appeared against the concerns were Lieutenant-Governor Beidleman, David I. McCahill, H. Etheridge, H. J. Van Buren and Clyde Ferris. Banking Commissioner John S. Fisher, Ralph E. Baker and T. E. Coleman appeared for the companies.

Key Route Holders Respond to Call for Deposits

With respect to the proposed reorganization of the San Francisco-Oakland Terminal Railways, Oakland, Cal., it is stated that no definite plan of reorganization has been decided upon, but that under the suggestion of the State Railroad Commission of California it has been deemed advisable to ask for the deposits by the various bond and note holders, partly for assisting in the reorganization and partly for the purpose of learning to what extent the various security holders appreciate the necessity of action to conserve their various interests.

The reorganization committee is said to have received approximately $6,500,000 of the $20,000,000 of bonds of the company, representing some eighteen different issues.

It was explained by the members of the reorganization committee last December that since 1916, the East Bay communities had been giving serious consideration to the question of a resettlement franchise for the company. The voters have passed an enabling act and have taken initial steps for the submission of the franchise question to the people for final decision. In this connection, the Railroad Commission, with the co-operation of the municipalities and the company, is engaged in placing a valuation upon the company's property.

Municipal Railway Operation Segregated

At the instance of Hugh M. Caldwell, Mayor of Seattle, Wash., an ordinance has been passed by the City Council assuring the complete segregation of the operation and maintenance of the Seattle Municipal Railway from the Department of Public Utilities. The ordinance as passed creates a department to be known as the Division of Municipal Railways, to be under the direction of a general superintendent.

As heretofore reported, David W. Henderson has been appointed to this position. The ordinance provides that the operation of the municipal railway, including cars and trains, carhouses and shops, and the maintenance of way and structures be placed in an administrative section of the Department of Public Utilities, to be known as Division of Municipal Railways.

Need $6,625,000 for Repairs

New York City's surface lines need about $6,625,000 to put their tracks, cars and other equipment in first-class operating condition, according to testimony of witnesses at a recent hearing before the Public Service Commission for the First District. In some instances the deferred maintenance charge covers paving along the right-of-way, which some of the roads in the hands of receivers have frankly stated their inability to repair.

Paving repairs are being made by the city, and the cost charged against the companies, to be later liquidated. In some cases the testimony showed that the cars of several companies need repairs to the extent of from $500 to $1,000 each. Cars, tracks and equipment generally, it was stated, however, are at the present time in safe operating condition, but if repairs are much longer neglected the margin of safety will be decreased.

Financial News Notes

New Director at Charleston.—W. King McDowell has been elected a director of the Charleston Consolidated Railway, Gas & Electric Company, Charleston, S. C., to succeed William M. Bird, deceased.

Three-Year Notes Called for Payment.—The Empire State Railroad Corporation, New York, N. Y., has elected to call for payment on May 1 all of its three-year 6 per cent mortgage notes then outstanding.

Bond Issue Approved.—The Department of Public Utilities of Massachusetts has approved an issue of $500,000 twenty-year 5 per cent mortgage bonds by the Middlesex & Boston Street Railway to refund a similar amount of 4½ per cent bonds maturing April 1, 1920.

Two-Year Notes Offered.—Bonbright & Company, New York, N. Y., are heading a syndicate which is offering $2,000,000 of two-year 7 per cent gold notes of the United Light & Railways Company, Grand Rapids, Mich. The notes are dated April 1, 1922. They are being offered at a price to yield more than 8 per cent.

Hyde Park Line Continued.—The Public Trustees of the Eastern Massachusetts Street Railway, Boston, Mass., on March 28 announced the continuance of service in the Hyde Park district. Plans are being devised for the installation of one-man cars and the purchase of electricity for this district, thereby shutting down the Hyde Park power house. The terms of operation remain to be fixed.

Manufacturer Offers to Buy Road.—As a solution of the higher fare controversy in Poughkeepsie, Norman Milliken, head of the Mohawk Plow Works in that city, has offered to buy out the Poughkeepsie & Wappingers Falls Railroad at its appraised valuation. The railroad, which is now charging a 6-cent fare, has an application pending for an increase to 8 cents, but thus far the city officials have refused this concession.

Tide Water Stock Offered.—The First National Trust Company, Durham, N. C., and Durfey & Marr, Raleigh, N. C., recently offered for subscription 7 per cent cumulative preferred stock of the Tide Water Power Company, Wilmington, N. C. The proceeds from the sale of the preferred stock will be used to liquidate current liabilities, retire $350,000 of bonds and to make betterments and additions to plant. Included in the company's properties are the railway lines in Wilmington.

Interest Payment Arranged.—J. D. O'Keefe, receiver of the New Orleans Railway & Light Company, New Or-

leans, La., notified holders of the 4½ per cent general mortgage bonds of that company that the coupons due on Jan. 1, 1920, would be paid on March 30 upon presentation at the office of the New York Trust Company, or at the Hibernia Bank & Trust Company, New Orleans. In addition to the coupons, 26 cents per coupon representing interest thereon was paid.

New Bond Issue for Massachusetts Road.—The Middlesex & Boston Street Railway has been authorized to issue twenty-year bonds to the value of $500,000 to bear interest at a rate not exceeding 4½ per cent. These bonds will be used for paying and refunding a $500,000 issue of the Lexington & Boston Street Railway which expired on April 1, 1920.

Discharge of Receiver Expected Soon.—It is reported from Binghamton, N. Y., that Receiver W. G. Phelps of the Binghamton Railway and his attorney, Thomas J. Keenan, of Curtiss, Keenan, Brink & Harrison, are making all needed legal preparations for paying off, within the next six months, $400,000 in outstanding debts and obligations against the company, and also meeting $75,000 in loans obtained by Mr. Phelps upon receiver's notes. It is expected that the receivership will be lifted in six months.

More Massachusetts Lines to Suspend.—P. F. Sheehan, manager for the Eastern Massachusetts Street Railway at Brockton, Mass., announces the Rockland-Braintree depot line will no longer be operated and that, in view of the loss of patronage, the Queen Anne's corner route will probably be discontinued, although the decision so to act will be left in the hands of the Brockton division service board at its next meeting. The decision with regard to the Rockland-Braintree line grew out of the controversy with the Weymouth town officials, who have allowed the jitneys to run again.

Readjustment of Securities Abandoned.—The stockholders of the North American Company, New York, N. Y., have abandoned the plan calling for a rearrangement of the capital stock of the company as outlined recently in the ELECTRIC RAILWAY JOURNAL. William Nelson Cromwell has been elected chairman of the board of directors of the company to succeed the late George Sheldon and Albert D. Boardman has been elected a director. The resignation of James D. Mortimer as president of the company, effective on Nov. 1, was referred to at length in the ELECTRIC RAILWAY JOURNAL for April 3.

Jersey Senate Approves Valuation Measures.—The New Jersey Senate has passed the measure of President Clarence E. Case providing for an independent appraisal of all electric railway properties in New Jersey. The Governor, State Treasurer and State Comptroller, under the provisions of the measure, are to compose a commission which will supervise the work having to do principally with the valuation of the Public Service Railway, Newark, N. J., property by expert engineers and make a report, which will form the basis for fixing fair and equitable rates of fare. An appropriation of $100,000 is provided to carry on the work.

Illinois Road Sold to Bondholders.—The Galesburg & Western Railroad, formerly the Rock Island Southern Railroad, Galesburg, Ill., has been sold for $151,000 to W. S. Hammons, Portland, Me., acting for the committee of the bondholders, said committee consisting of W. S. Hammons, Portland, Me., chairman; Frank S. Wingate, Hallowell, Me., and M. O. Williamson, Galesburg, Ill. There was one other bidder at the sale, C. C. West, said to represent Walsh Brothers, owners of the majority of the stock of the railroad. The sale to Mr. Hammons will now go before the Circuit Court of Knox County for confirmation by Judge Thompson.

Recommends Bonds Be Extended.—At the hearing in St. Louis, Mo., on March 30 before Special Master Henry Lamm to inquire into reconstruction work to be carried out by the United Railways, St. Louis, Judge Lamm took up in informal discussion the question of the means to be adopted to meet the bonds of the St. Louis Railway, an underlying company of the United Railways, when they fall due on May 1. Henry S. Priest suggested that it might be well to seek the consent of the holders of the bonds to an extension of them at a higher rate of interest rather than to issue receiver certificates to refund the bonds. Judge Lamm said that he thought well of this plan. He recommended it to the receiver.

More Time Allowed for Shore Line Report.—In the case of Old Colony Trust Company, Boston, Mass., vs. the Shore Line Electric Railway, Norwich, Conn., Judge Kellogg has granted Receiver Robert W. Perkins until May 15 to file his semi-annual statement. Ordinarily it should be filed by April 5, but Attorney Charles B. Whittlesey stated that the report was voluminous and more time was required. Judge Kellogg has also approved the application authorizing the receiver to pay the interest due on the bonds of the Groton & Stonington Street Railway, as it was represented to the court that paying the interest would prevent default and perhaps permit the receiver to dispose of the road to better advantage.

Receivers for Rock Island Southern Company.—Federal Judge Martin J. Wade of the Southern District of Iowa has appointed C. N. Abbott, vice-president of the Central Trust Company, Chicago, and C. H. Bacon, vice-president, in charge of operation of the Chicago, Rock Island & Pacific Railway Company, as receivers for the Rock Island Southern Railway Company. Judge Fitzhenry of the Federal Court at Peoria has concurred in the action of Judge Wade. The Mississippi Valley Railway & Power Company, controlled by Walsh Brothers, owns more than one-half of the outstanding bonds of the Rock Island Southern. Under government control steam trains were substituted for electric cars.

Last Traces of Municipal Railway Removed.—The last traces are being removed of the Yazoo (Miss.) Municipal Railway, which suspended operation in November, 1918. The Meridian (Miss.) *Dispatch* of March 18 under a date line from Yazoo City said: "The last remnant of the Yazoo City street car line has been disposed of, the Goldstein Hide & Fur Company having sold the old cars and trailers to Helena, Ark., to be rebuilt and used. The doing away with the line is a source of regret to many, and even though the railway did not make expenses the other utilities were making money and it all belonged to the city and the loss was nothing short of taking money from one pocket and putting it in the other."

An Offering That Is Different.—The Carolina Beach Railway, Wilmington, N. C., is seeking to finance itself through the sale of securities direct to the public. The company is offering $500,000 of 6 per cent ten-year gold coupon bonds "secured by a first mortgage on all the property owned by the Carolina Beach Railway." The company is described as building a railway from the city of Wilmington to Carolina Beach, which is located on the mainland and only 13 miles south of the city. No mention is made of the offering price, but "a bonus of 10 per cent of the common capital stock is offered to the purchaser of each $1,000 bond on the first $100,000 of these bonds sold." There is also a land exchange feature.

Will Sell Additional Stock.—Henry J. Davies, treasurer of the Cleveland (Ohio) Railway, has notified stockholders that it is now necessary to sell the remaining 10,000 shares of stock in the treasury in order to make needed improvements in the way of buildings, track and power equipment, as well as purchase land for its purposes. The requirements are that this stock must be sold at par or above, although it has been around 96½ and 97½ on the market for the past few days. Mr. Davies points out that the Cleveland and Lakewood franchises have been extended to May 1, 1944, and that an increase in the maximum permissible fare to 6 cents or nine tickets for 50 cents has been made. The quarterly dividend due on April 1 was based upon the new 7 per cent annual rate, granted by the Council some time ago, although an attempt is being made to have the ordinance increasing the rate from 6 to 7 per cent submitted to a referendum vote. Additional petitions for this referendum were certified to the City Council by City Clerk C. J. Benkoski on April 5. Councilman Henry C. Gahn, in charge of the fight for a referendum, will prepare a resolution for submitting the question to a vote and this will be acted upon at the next meeting of the Council.

Traffic and Transportation

Columbus Fares Advance

Go to Six Cents Under Provisions of Weinland Ordinance—Men Receive Pay Increase

A 6-cent cash fare with five tickets for 25 cents went into effect in Columbus, Ohio, on April 3. On that date the new franchise for the Columbus Railway, Power & Light Company, granting the company an increase in fare, became operative. The wages of the company's employees have been increased to a maximum of 50 cents an hour.

Under the terms of the franchise ordinance, which was passed by the City Council on Feb. 9, the 6-cent cash fare will continue for a six-year period. During the first two years tickets will be sold at the rate of five for 25 cents, and during the remaining four years at the rate of six for 25 cents. Free transfers and 10-cent owl car service are also provided. Children under six years of age will be carried free. Three cents is to be the rate for children between the ages of six and ten years.

$2,400,000 for Improvements

In return for the higher fare the company is required to spend $2,400,000 during the six-year period for extensions, street paving and repaving and the laying of new tracks. Expenditures are limited to $750,000 a year. The Council, when it deems necessary, can order the company to extend its lines in North High Street, West Mound Street and other thoroughfares, such extensions not to exceed five miles within the next six years. The company is not to be compelled to build more than two miles of new track in any one year.

A wage advance amounting to 5 cents an hour in the case of carmen and to 12 per cent in the case of shopmen has been awarded the employees of the company by the board of arbitration which has been considering their demands. The arbitration of future disputes between the company and the union is also provided for in the board's report. Platform men for the first three months will receive 45 cents an hour, for the next nine months 48 cents and thereafter 50 cents.

The new scale was effective April 1 and is retroactive to Jan. 1 and is to run until March 31, 1921. Extra platform men receive a minimum wage of $18 a week. Following is the wage scale of all other employees: Train dispatchers, $128 a month; pitmen, 50 cents an hour; track laborers, 40 cents; trackmen, 45 cents; curve cleaners, 40 cents; truckmen, 57 cents; helpers, 47 cents, and machinists, carpenters, blacksmiths, electricians and painters, 67 cents.

Enactment of the fare measure, known as the "Weinland bill," resulted from the need on the part of the company for an increase in revenue to meet these wage advances. The men struck last year, demanding a substantial raise in pay. S. D. Hutchins, of the Westinghouse Traction Brake Company, chairman of the board of arbitration, appeared before the City Council several months ago and asked that the company be permitted to raise its fare so that it would be in a position to meet the terms of the arbitrators' award.

Council's Aid Sought

Mr. Hutchins stated on that occasion that the arbitrators would withhold their award pending action by the city authorities on the question of granting the company financial relief. Presenting a statement of the company's financial condition, he declared that, unless a higher fare were allowed, the company could make no further increase in wages. The company subsequently presented a tentative draft of a bill providing for a 6-cent cash fare and in other respects similar to the ordinance later enacted by the Council.

Opponents of the fare increase made a concerted effort to defeat the Weinland measure through the medium of a referendum. Petitions to submit the question of allowing the higher fare to the voters at a referendum election were circulated. More than 16,000 names were signed to these petitions. However, the City Clerk rejected 8,783 signatures. The petitions therefore lacked 1,256 signatures of the 8,740 necessary to certification.

The fare increase will, it is estimated, give the company additional revenue of $1,100,000 a year.

Rhode Island Appeals Heard

The Rhode Island Supreme Court has taken under advisement the appeal of nine municipalities from orders of the State Public Utilities Commission authorizing the Rhode Island Company, Providence, to increase its fare. The fare increase that gave rise to the appeals went into effect May 5, 1918, when a central 5-cent fare and transfer zone of 2½ miles air line radius about the Providence traffic center and of 2 miles air line radius about the traffic centers of Pawtucket, Woonsocket and Riverpoint was established. On Sept. 23, 1919, by order of the commission a 6-cent fare was authorized in all zones and a 2-cent charge for transfers. At the hearing before the Supreme Court the towns contended that the commission exceeded its authority in permitting the company to raise its fare on these occasions.

Merchants Promise Aid

State Chamber of Commerce of Connecticut Recommends Legislative Relief Previously Refused

A special committee of the State Chamber of Commerce of Connecticut engaged on a study of electric railway conditions in that State has decided to recommend to the chamber that that organization ask the 1921 session of the Legislature to relieve the electric railways of all paving and bridge assessments, as well as taxes on gross income which are payable to the State.

The Connecticut Company, which is petitioning the Public Utilities Commission for the retention of a zone fare collection system, put into effect on Nov. 2 last, will be the greatest gainer if the proposed legislation should be adopted, as it operates over 90 per cent of the electric railway mileage in the State. The utilities commission is expected to make public its decision in the matter of the zone fare system within a few days.

The special committee of the chamber which conducted the investigation consists of Attorney Arthur M. Waitt, Sharon, chairman; J. B. Milliken, president of the Yale & Towne Mfg. Company, Stamford; Morgan B. Brainard, federal trustee of the Connecticut Company and vice-president of the Aetna Life Insurance Company; Robert W. Perkins, receiver of the Shore Line Electric Railway; George T. Kimball, secretary of the American Hardware Corporation, New Britain; Attorney Lucius J. Stevens, Clinton, and Ira M. Ornburn, secretary of the State Federation of Labor.

Details of Report Withheld

Roger W. Davis, Hartford, who attended the hearings on the zone fare system in behalf of the committee, has issued a report to the members, but details of this report are withheld pending the decision. The 1919 session of the Legislature was asked to pass legislation of the nature recommended by the committee of the Chamber of Commerce, but refused to do anything to help the overburdened companies. Since that time the companies have fallen into worse straits and it was in an effort to save the lines that the state chamber named the committee of inquiry.

In addition to the other assessments the Connecticut Company must pay, the city of Hartford levies upon it 2 per cent of the gross income on lines within the city.

Safety Suggestions Accepted

As a result of the safety work being conducted on the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., the employees have made 1,700 suggestions for improving safety conditions during the last three years. Of these 90 per cent have been accepted and put into force by the company with the result that the number of accidents has been materially reduced.

Zone System in Connecticut Modified

Commission Convinced System Is Correct in Principle—State Relief Suggested—Changes Effective May 9

The zone fare system of the Connecticut Company is sustained in the decision of the Public Utilities Commission made public April 9, but important modifications in the scheme will force the company to change over all its zone limits, issue commutation and school tickets and generally rearrange its accounting methods. The rates imposed by the commission will go into effect on May 9, but if "after a reasonable time" they are found to be unfair to company or public, the commission promises that it will reopen the case. The mileage system which the company placed in operation on Nov. 2, of last year, and which was attacked by representatives of nearly a score of towns, is declared a fair method of fare collection by the commission. The commuters of the town of Manchester, who had been arguing that a commutation rate of twenty years' standing should not have been shelved last November, won their point, the commission deciding that the daily riders in towns having a population of 25,000 or more shall have a lower rate.

Salient points in the decision are:

All zones throughout the company's lines are to be 1 mile in length, instead of present system, which makes initial zone in four largest cities of State 1½ miles, with second zone 1 mile. Smaller towns at present have 1.2 miles initial zone, 1 mile second zone. Country places at present have all zones 0.625 of a mile.

Cash fare is 6 cents for smallest two zones or any portion thereof, as at present, with 3 cents for each additional zone.

Zone ticket books containing fifty tickets sold for $1, with not less than three tickets to be collected for a ride in three zones or less and one ticket for each additional zone.

Monthly commutation tickets good for daily rides between traffic centers of cities and boroughs having a population of 25,000 or more and points five zones distant from the traffic center, the tickets to be at rate of 1.75 cents per zone.

School tickets to be at rate of 1 cent per zone, with initial charge of 3 cents for ride of three zones or less, with charge of 1 cent for each additional zone after the first three.

Present transfer system, which requires payment of 2 cents per zone if passenger has traveled more than two zones on first initial ride, is continued with modifications to meet the new system of fare collection.

The decision does not apply to the portion of the Shore Line Electric Railway, Norwich, recently acquired by the company.

Legislative Relief Recommended

The commission recommends that legislation be enacted to relieve the company of present street paving taxes, bridge building taxes and unfair jitney automobile competition.

The company officials had no comment to make on April 9 on the decision.

The hearing on the protests of the towns against the present system of fare collection started in December, and when final oral arguments were made on March 2 the commission told a representative of the ELECTRIC RAILWAY JOURNAL that the decision would be announced early in April. The commission is composed of Richard T. Higgins, Winsted, chairman; Charles C. Elwell, New Haven, and Joseph W. Alsop, Avon. The towns which appeared in opposition at the hearing were New Haven, Meriden, Bridgeport, Norwalk, Stamford, Milford, Hamden, New Britain, Orange, Newington, Berlin, Bloomfield, Plainville and Southington.

Portions of the commission's findings of especial interest follow:

It is a recognized fact, admitted by all the evidence in this case, that street railways supply a necessary public service not only for urban but for suburban and inter-urban transportation, and their suspension would be a public calamity. Some of the elements producing the precarious street railway conditions in this State are beyond the power of this commission to overcome, and can only be remedied by legislative enactment. Statutory burdens such as street paving, bridges, taxes and unfair automobile competition are among these elements. The labor competition of industrial enterprises which are unrestricted in the selling price of their commodities is an economic condition which the carriers themselves must work out.

Law of Diminishing Returns a Factor

The depreciated purchasing value of the dollar and the high and increasing cost of producing service are factors which should naturally be met by corresponding increases in rates, but there is a limit at which increased rates will produce increased revenue.

The duty of a utility company is not only the rendition of a public service, but the rendition of good and adequate service. This commission is fully aware of the fact that to render such service a company must have sufficient finances, sufficient gross revenue to pay all its operating expenses, fixed and overhead charges, set aside by a proper depreciation reserve, and pay a fair return on the investment. We feel that any order of the commission not based on this general policy would work not only an injustice to the company but to the public entitled to receive such service.

Street railway service is a direct benefit not only to its patrons, but to the communities, business industries, property owners in the localities served; and yet under present conditions all the expense of supplying such service, including statutory and collateral obligations, is borne by the car riders, they being the only source of revenue to the company.

The company, whose public duty is to carry passengers over and along the highway, is required to expend large sums of money for cleaning the snow and ice off the streets, for the construction of highway bridges and for paving and maintaining a large portion of the street area. No other individual or corporation using the highway is required to perform or directly pay for such work. The more of these expenses the company has to pay the greater will necessarily be the rates of fare for the car rider.

Pavement Costs a Serious Burden

The demand for improved and expensive pavement in our public highways and the very expensive care and maintenance of that pavement are due largely to automobiles, jitneys and trucks constantly using the highways, and in the case of the heavily loaded truck, using pavement destroying chains or other worse forms of non-skid devices.

The car rider is not only called upon to maintain the tracks and roadbeds of the particular company which affords him transportation, but is required to assist in maintaining a free roadbed and expensive type of pavement for the limousine, the numerous pleasure and touring cars, the constantly increasing number of heavy trucks and for the so-called public service automobiles or jitneys running in competition with his own company.

The person using the automobile in any and all of its various forms and types has the right-of-way provided, built and maintained by public taxation and by direct contribution of the street car rider.

A rate sufficiently high to meet all such expenses and afford a fair return on the value of the property or the actual investment therein, taking into consideration the nature of existing competition, would have a tendency to lessen street railway travel disastrously and destroy the usefulness of the carrier in supplying what should be a cheap, convenient and reliable form of transportation available to all the people.

It has for some time been a recognized fact in street railway operations that the old system of flat fares with its flagrant inequalities and numerous long haul rides at an absolute loss to the company must be abandoned if the company is to be self-supporting. It is unquestionably true that the long zone or flat rate system is popular and convenient and that it contributed materially in the building up of suburban sections and in relieving city congestion, but the inability of the company to continue such a system longer makes it imperative for the preservation of service to adopt a more business-like policy, unless aided by the State or municipalities served. Such aid cannot be forthcoming at the present time and it becomes necessary to adopt some other system or a radical modification of the system.

It seems to the commission that the most equitable policy thus far suggested or adopted is the zone or distance tariff system, and accordingly the commission will retain the general basic principle of the zone or distance tariff system adopted by the company in the rates which it may prescribe hereunder. . . . .

Co-operation Essential

To make any rate or policy established by the commission satisfactory requires acquiescence and an honest endeavor on the part of the company and its employees to render good service, and a spirit of co-operation and good will on the part of the public. The enterprise and degree of service rendered by the respondent company during the past winter months, which were almost unprecedented in the severity of weather, affecting all kinds of transportation, were indeed commendable and we believe helped to awaken public sentiment to the necessity and importance of sustaining and preserving the street railway service. The commission being firmly convinced of the equity and fairness of the rates herein proposed and decreed under present conditions, earnestly requests the assistance and co-operation of the company and of the general public in making them a success or at least of giving them a fair trial. If at the end of a reasonable period of time it is demonstrated that the rates or system are unfair, either to the company or to the traveling public, this commission, upon proper presentation will unhesitatingly and without prejudice by the reason of anything herein stated or decreed, consider and revise such rate or system in accordance with facts then presented.

One-Man Car Order Rescinded

Unless the Wisconsin Railway Light & Power Company, La Crosse, Wis., is permitted to install one-man safety cars on its lines in that city it will be compelled to ask the Railroad Commission of Wisconsin for authority to increase fares, according to the company's answer to the protest of the city of La Crosse against use of one-man cars.

The state body recently granted the company permission to install eight one-man cars—a permission that was later rescinded when the protests of La Crosse citizens began pouring in to the commission in Madison.

The company sets forth in its answer that it is at present operating without a reasonable return on its investment despite the fact that a 6-cent fare is being charged.

The company planned to purchase eight new cars at once and convert the present rolling stock from two-men to one-man type.

The Railroad Commission will shortly hold a public hearing on the matter in La Crosse.

Transportation News Notes

Wants 10 Cents in Portland.—Ten-cent cash fares are asked in a petition filed by the Cumberland County Power & Light Company, Portland, Me., with the State Public Utilities Commission. The company proposes to increase the ticket rate from 7 cents to 8 cents. The cash fare is now 9 cents.

To Probe Phoenix Service.—A committee representing the City Commission and local business interests has been appointed by Mayor Corpstein of Phoenix, Ariz., to make a thorough study of the condition of the Phoenix Railway. The request for an investigation of the company's service took the form of a petition signed by a large number of citizens.

More Cars Asked for St. Louis.—Hearings were begun on March 30 before Special Master Lamm on the application of Rolla Wells, receiver for the United Railways, St. Louis, Mo., to spend $2,000,000 for the purchase of 160 additional cars, $917,380 for track reconstruction within the city and $140,200 for track reconstruction on the St. Charles line in St. Louis County. The company proposes to rebuild about 31 miles of city line.

May Raise Cincinnati Fare.—It is reported that the platform employees of the Cincinnati (Ohio) Traction Company will ask for an increase in wages from a maximum of 50 cents an hour to a maximum of 75 cents an hour, when their contract is readjusted on July 1. If this increase should be granted, it is believed that the rate of fare will have to be increased ½ cent to cover it. The rate is now 7 cents, with universal transfers.

Seven Cents Asked in Austin.—The Austin (Tex.) Street Railway has filed a petition with the Austin City Council asking authority to increase its fare from 5 cents to 7 cents for adults and from 2½ cents to 3½ cents for children. The Chamber of Commerce after an investigation of the earnings and operating expenses of the company has recommended that the increase be granted for a period of five years. The City Attorney has been instructed to draft an ordinance giving the company the requested increase.

Traffic Survey at Springfield.—The City Council of Springfield, Mass., has voted $3,000 for a survey of traffic conditions in that city. Peter Witt, Cleveland traffic expert, has agreed to conduct the investigation on condition that he will have the co-operation of the Springfield Street Railway. Assurances have been given that such co-operation will be forthcoming and that any reasonable suggestions for speeding up service will be carried out.

Deprecates City's Attitude.—The attitude of the city of Pittsburgh, Pa., toward the decision of the Public Service Commission of Pennsylvania, in regard to the valuation of the Pittsburgh Railways property, recently announced in these columns, was deprecated by A. W. Thompson, president of the Philadelphia Company, the holding concern of the traction company, speaking at the weekly dinner of the Current Topics Club in the Knights of Columbus Clubhouse on April 5. Mr. Thompson charged that a lack of interest on the part of the public was responsible for the failure of the public utilities companies to give proper service.

Commission Ouster Bill Fails.—A bill which, had it been enacted, would have automatically removed the members of the New Jersey Board of Public Utility Commissioners from office was defeated on April 5 in the State Assembly. The bill proposed to take from Governor Edwards the power to appoint a new board. Under the bill as originally drafted the members of the proposed new commission would have been elected by the Legislature in joint session, but when the measure was placed on third reading it was amended to provide for their appointment by the Chief Justice of the Supreme Court.

Wants Buses in Dallas.—Would-be jitney operators of Dallas, Tex., have appealed to the State Court of Civil Appeals in an effort to obtain a franchise to operate a bus route in competition with the lines of the Dallas Railway. Petition for a franchise from the city was presented to the City Commission by Currie McCutcheon and Marion S. Church. This was denied by the City Commission. Mandamus was then sought in the District Court to compel the city authorities to submit the proposed franchise to a referendum vote. The District Court declined to issue the order prayed for. Notice of appeal has been given from the ruling of the District Court and the question will soon come up for hearing before the Court of Civil Appeals.

Would Lower Worcester Fare.—A 5-cent initial fare with a 3-cent charge for a transfer would solve the difficulties of the Worcester (Mass.) Consolidated Street Railway, in the opinion of Mayor Peter F. Sullivan of Worcester. Mayor Sullivan has addressed an open letter to Clark V. Wood, president of the company, urging the adoption of the "five-and-three" plan. The Mayor contends that this plan would best serve the company's interest and at the same time would benefit the people of Worcester. Under the fare system now in effect the city is divided into two zones with a 7-cent fare in each and with no transfer privilege. If the "five-and-three" plan failed to supply adequate revenue, the Mayor states that he would advocate a 6-cent fare with a 4-cent transfer charge. Under the zone plan the fare in each zone was originally 5 cents. It was then raised to 6 cents and subsequently to 7 cents.

Will Reroute Los Angeles Lines.—Sweeping plans for the rerouting of its lines have been announced by the Los Angeles (Cal.) Railway. The rerouting program was worked out by the company at the suggestion of the State Railroad Commission, and will be put into effect about May 1. The commission recommended the adoption of drastic measures for the relief of congestion in the city's business district. The City Council has already passed a "no-parking" ordinance, as previously announced in the ELECTRIC RAILWAY JOURNAL, which becomes effective on April 10. Under the terms of the ordinance the parking of vehicles within the congested area is barred between the hours of 11 a. m. and 6.15 p. m. As a result of the rerouting of car lines and the enforcement of the anti-parking rules, the company hopes to decrease the present car headway by 50 per cent.

Favors Zones for Hudson Tubes.—The Interstate Commerce Commission has suspended a tariff filed with it by the Hudson & Manhattan Railroad, New York, N. Y., under which the company proposed to charge a straight 8-cent fare. In a letter to Oren Root, president of the road, the commission stated in effect that it would grant an increase on a zone system rather than the straight 8-cent fare requested by the company. It was indicated by the commission that the company was entitled to a 6-cent fare from Hoboken and Jersey City to the Hudson Terminal and a 10-cent fare from the Jersey terminals to uptown New York. The letter gave permission to file tariffs on these increases and intimated that the increases would be allowed. The company asked for a straight 8-cent fare, which would have given it an increase of $3,213,117, or 4.7 per cent, while the proposal of the commission would increase the revenues by $2,344,012, or 4.32 per cent on its allocated debt of $70,263,300. The company will file the new rate.

Acute Car Shortage in Dallas.—The Dallas (Tex.) Railway is losing $400 a day because of shortage of cars to handle passengers, according to Richard Meriwether, vice-president and general manager. This estimate is based on the number of persons passed up by the cars of the company during the morning and evening rush hours because of the lack of cars to haul them. During the rush period in the morning an average of 19,640 persons are carried every day. Of this number, approximately 13,960 are seated. The others are forced to stand. During the rush period in the evenings an average of 21,665 are carried daily, of which number 14,233 are seated. An average of 36.2 per cent of the passengers hauled stand up in the evenings and 32.2 per cent of those hauled stand up in the mornings. Investigation discloses that fully one-half of those persons passed up by the cars during the rush hours either walk to work or seek some other conveyance.

Personal Mention

Mr. McClure at New Post

Made Vice-President in Charge of Operation of Ohio Electric Railway

J. Harvey McClure, general manager of the Citizens' Traction Company, Oil City, Pa., has been selected by Day & Zimmerman, utility managers, to operate the Ohio Electric Railway, Springfield, Ohio, of which they have taken charge. Mr. McClure has been given the title of vice-president of the Ohio Electric in charge of operation. He has already taken up his new duties, making his headquarters at Lima, Ohio.

Mr. McClure's new position, by enlarging the scope of his duties and responsibilities, will give him further opportunity to demonstrate his methods, which have met with marked success in Oil City for several years. As manager of the Oil City properties of Day & Zimmerman he has not only proved his ability to operate the lines in his care in an efficient and economical manner, but has made for himself a name for fairness and square dealing among the people of Oil City and Franklin.

His new duties will call for exercise of these qualities on a much larger scale. The Ohio Electric Railway operates 530 miles of city and interurban line in both Ohio and Indiana. The road connects Toledo, Lima, Defiance, Springfield, Dayton, Union City, Columbus and Zanesville, in Ohio, and Fort Wayne and Richmond in Indiana. The road was placed under the direction of Day & Zimmerman on April 1.

Mr. McClure has been connected with the Citizens' Traction Company since 1913. At that time he had already been in the service of Day & Zimmerman for several years. In 1914 he was made general superintendent of the Oil City and Franklin lines, and was subsequently advanced to general manager. He has also served as general manager of the Citizens' Light Company and the Monarh Park Hotel Company. In 1918 he was appointed vice-president in charge of operation of the Youngstown & Suburban Railway, Youngstown, Ohio. Since receiving his appointment with the Ohio Electric Railway he has resigned from these companies.

Co-operation and harmony have characterized Mr. McClure's tenure of office at Oil City. Upon assuming his duties there he adopted a policy of candidness and fairness toward the public as well as toward the company's employees. Constantly adhering to this policy, he set out to build up the property. Under his direction numerous improvements and extensions have been made. The results of his methods are seen in the fact that, although the company has increased its fare twice, first to 6 cents and more recently to 7 cents, the rate advances have not evoked a public protest.

New Seattle Manager

David W. Henderson, Superintendent of Transportation, Placed in Charge of Municipal Railway

David W. Henderson, superintendent of transportation of the Seattle (Wash.) Municipal Street Railway, has taken up the duties of general superintendent of the system. Mr. Henderson, who assumed the direction of the municipal lines following the resignation of Thomas F. Murphine, has been permanently appointed to the position of general superintendent by Mayor Hugh M. Caldwell.

D. W. HENDERSON

In his new capacity Mr. Henderson will have charge of the entire municipal railway system, comprising 235 miles of track. He does not, however, succeed Mr. Murphine as director of public utilities and thus has no control over the other utilities of the city. Mayor Caldwell, who during the mayoralty campaign attacked the methods of the municipal departments, has since his election divorced the railway from the public utilities department. E. D. O'Brien has been placed in charge of the latter.

Mr. Henderson has been connected with the Seattle traction system, at first under private and later under public ownership, for the past eighteen years. At the time of the purchase by the city of the Seattle lines of the Puget Sound Traction, Light & Power Company a year ago, he was superintendent of transportation. He entered the employ of the company in 1902 as a motorman. In 1907 he was advanced to the position of inspector and in 1911 he was promoted to assistant superintendent of transportation, serving under Guy A. Richardson, then superintendent of transportation. In May, 1912, Mr. Henderson was advanced to division superintendent. In November of the same year, he was appointed to the position of superintendent of transportation. He retained this position until April, 1919, when the lines were transferred to the city of Seattle.

Mr. Henderson was born in Dumferline, Scotland, on Feb. 24, 1873. His parents came to the United States in 1881, settling in Randolphe, Wis. He received his early education in Randolphe, completing a teacher's course at Valparaiso, Ind. For the next eight years he taught school in Wisconsin, after which he went to Seattle and entered the employ of the Puget Sound Traction, Light & Power Company.

Merritt Strahan has assumed the duties of division superintendent of the Union Traction Company of Indiana, Anderson, Ind., with headquarters at Indianapolis. Mr. Strahan has been connected with the company since 1910.

William H. Tobin has been appointed chief inspector of the Berkshire Street Railway, Pittsfield, Mass., to succeed Thomas E. MacDonald, resigned. Mr. Tobin has been in the company's employ for the past twenty years. Prior to his new appointment he served as an inspector.

Harry H. Adams, superintendent of shops and equipment of the Chicago (Ill.) Surface Lines, has been given the same title under the new organization plans of President Henry A. Blair, but he will report to the general manager instead of to the chief engineer as heretofore.

George W. Wells, who has been director of exhibits for the American Electric Railway Association, has joined the staff of the International Exposition of Industries, Grand Central Palace, New York City. He will have charge of the electrical division of the mechanical department.

F. J. Tew, who for the past seven years has been master mechanic of the Manila Electric Railroad & Light Corporation, Manila, P. I., is about to return to the United States. Mr. Tew expects to arrive in San Francisco during the present month. He has not yet made definite plans for the future.

John D. Wells, former director of publicity for the International Railway, Buffalo, N. Y., and former president of the American Press Humorists' Association, has become associated with William A. Morgan, financier, as advertising counselor. Mr. Wells was at one time managing editor of the Buffalo *Evening News*.

Henry M. Brooks, who has for a number of years been connected with the Insull interests, most recently as manager of the bond and stock department of the Middle West Utilities Company, Chicago, Ill., has resigned to go with W. G. Souders & Company, an investment house, and will be located in its New York office.

Changes in Chicago Elevated Organization

Changes in the organization of the Chicago Elevated Railways were announced by President Britton L. Budd on March 30, as follows:

Bernard J. Fallon, engineer maintenance of way, was appointed assistant general manager.

Edward J. Blair, organization engineer, was appointed assistant to the president.

H. A. Johnson, superintendent of shops and equipment, was appointed organization engineer, having the duties of analyzing all operating methods, costs, etc., preparing statistical information and from time to time making recommendations as to improved or more efficient methods, practices or processes in all departments. He will report to the general manager.

R. N. Wade, track engineer, was appointed engineer maintenance of way and structure.

Adolph H. Daus, assistant to the superintendent of shops and equipment, was appointed superintendent of shops and equipment.

E. C. Davis, general manager of the Burlington County Transit Company, Hainesport, N. J., has resigned.

Thomas E. MacDonald, chief inspector of the Berkshire Street Railway, Pittsfield, Mass., has resigned.

Frederick Isaacson, superintendent of transportation of the Ottumwa Railway & Light Company, Ottumwa, Iowa, has resigned.

L. E. Hollar, superintendent of transportation of the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., has resigned.

C. U. Peeling has resigned as general manager of the Cornwall Street Railway, Light & Power Company, Cornwall, Ont.

G. C. Miller, manager of the light and power departments of the Aurora, Elgin & Chicago Railroad, Elgin, Ill., has resigned to engage in the electrical merchandising business in Kokomo, Ind.

W. L. MacFarlane has been appointed general manager of the Cornwall Street Railway, Light & Power Company, Cornwall, Ont., succeeding C. U. Peeling, resigned.

Richard Kelly, general passenger agent of the Pacific Electric Railway, Los Angeles, Cal., has been made general passenger agent of the Southern Pacific Railroad, reporting to Vice-President Paul Shoup.

Elvin L. Hoffler has been appointed an assistant superintendent of the Wilkesbarre (Pa.) Railway. Mr. Hoffler has been employed as a bookkeeper in the auditing department of the company for the past fourteen years.

W. W. Waterson, superintendent of transportation of the Chicago, Ottawa & Peoria Railway, Ottawa, Ill., has succeeded L. E. Hollar as superintendent of transportation of the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind. Mr. Waterson joined the Illinois Traction System in 1904 as a trainman. Shortly thereafter he was promoted to train dispatcher. In 1912 he was appointed superintendent of the Peoria division of the St. Louis, Springfield & Peoria Railroad and five years later he was made superintendent of transportation of the Chicago, Ottawa & Peoria Railway.

F. E. Smith, Comptroller

Former Auditor of Chicago Union Traction Company Joins McGraw-Hill Staff

F. E. Smith, for fifteen years auditor of the Chicago Union Traction Company and of its successor, the Chicago Railways, has joined the McGraw-Hill organization with the title of comptroller. He entered actively upon his duties on April 1, 1920. Since May, 1918, and up to within the last month

F. E. SMITH

or two, Mr. Smith has been connected with the United States Shipping Board, Emergency Fleet Corporation, first as local auditor at Hog Island, where he built up a large auditing staff, and later at the headquarters in Philadelphia in the comptroller's office and in the department of cancellation, claims and contracts, which dealt with the claims arising from cancellations.

Mr. Smith's professional career has been largely with railroads, particularly electric railways. A native of Connecticut, his first railway experience was gained with the Hartford, Providence & Fishkill Railroad, now a part of the New Haven system. Two years later, or in 1884, he moved to Akron to join the accounting force of the Cleveland, Akron & Columbus Railroad, leaving that company in 1889 to become auditor for the receiver of the Zanesville & Ohio Railroad. During the five-year period in which he was connected with this company, he made numerous investigations of the financial condition of the properties of the Hollins-Clark Syndicate, the representatives of the bondholders of the Zanesville property.

In April, 1894, he was transferred to the position of auditor of the Lynn & Boston Railroad, which had passed into the control of this syndicate, and in 1899, when this property became a part of the Massachusetts Electric Companies, he was appointed by the new interests general auditor of the consolidated lines. In July of the same year, when the Hollins interests assumed control of the North and West Chicago Street Railways and organized the Chicago Union Traction Company, Mr. Smith was appointed its auditor, a position which he retained, as mentioned, until 1914, when the Chicago Surface Lines took over the operation of the surface lines in Chicago. He then moved to Florida and engaged in raising grape-fruit until his return north in 1918 to join the Emergency Fleet Corporation.

While connected with electric railway companies, Mr. Smith took an active part in association work. For two years he served on the executive committee and for six years on the committee on the standard classification of accounts of the Street Railway Accountants' Association of America, and in 1903-1904 was president of that organization.

W. S. Anderson has been appointed assistant to H. L. Mitchell, vice-president of the West Penn Railways, Pittsburgh, Pa. Mr. Anderson was formerly chief clerk in the company's Connellsville (Pa.) office. At the time of his promotion to his new position his fellow employees presented him with a gold watch as a token of remembrance.

Horace E. Miller, who was recently appointed chief dispatcher of the Pacific Electric Railway, Los Angeles, Cal., joined the company as a towerman in 1908. In 1910 Mr. Miller was promoted to dispatcher on the south division. He became assistant trainmaster in January, 1919, continuing in that capacity until his advancement to chief dispatcher.

W. H. Evans, assistant to the claim adjuster of the Wilkesbarre (Pa.) Railway, has been promoted to the newly created position of assistant superintendent. Mr. Evans entered the employ of the company nineteen years ago as a trainman. He served both as a conductor and a motorman, and was later advanced to inspector. He became assistant to the claim adjuster three years ago.

F. S. Welty, purchasing agent of the Omaha & Council Bluffs Street Railway, Omaha, Neb., has been promoted to assistant general manager of the company. In his new capacity Mr. Welty retains supervisory authority over the purchasing department, of which he has been in charge for the past thirteen years. He joined the company twenty-two years ago. For eight years he was connected with the transportation department. He was then transferred to the claim department, where he served for one year, at the end of which he was made purchasing agent.

A. B. Cronk has succeeded O. B. Gothlin as chief of the tariff bureau of the Indiana Public Service Commission. Mr. Cronk has for some time been serving as a deputy in the office of the Attorney General of Indiana.

William P. Burr, corporation counsel of New York City, has been appointed a Justice of the State Supreme Court. Mr. Burr has taken a prominent part in the New York City Board of Estimate's traction inquiry, conducting the case for the city.

O. E. Sterner has been appointed superintendent of transportation of the Ottumwa Railway & Light Company, Ottumwa, Iowa, to succeed Frederick Isaacson, resigned. Mr. Sterner has been connected with the company for the past twelve years.

A. M. Evans, assistant to the chief engineer of the Chicago (Ill.) Surface Lines, has resigned to accept a position in the organization of the Geyser Electric Company, Chicago, manufacturers of washing machines. Mr. Evans has been with the Chicago City Railway and the Chicago Surface Lines since 1906. During the war he served under Colonel Peter Junkersfeld as an officer in the construction division of the Quartermaster's Corps.

O. P. Gothlin, chief of the tariff bureau of the Indiana Public Service Commission, resigned on April 1. Mr. Gothlin will resume the practice of law. He will specialize in transportation matters, handling only cases relating to railroad rates and service. Mr. Gothlin was formerly chairman of the Ohio Public Service Commission. He has been with the Indiana commission since June, 1917, as chief of the tariff bureau, in which capacity he reorganized the tariff department.

C. H. Crooks, whose election as president of the Fort Dodge, Des Moines & Southern Railroad, Boone, Iowa, was noted in the ELECTRIC RAILWAY JOURNAL for April 3, was born in Iowa in 1874. Mr. Crooks entered the traction business in 1893 as a ticket agent with the Des Moines Union Railway. Two years later he was made agent of the Des Moines, Northern & Western Railway at Fonda, Iowa, leaving that position in 1898 to become agent of the Chicago, Milwaukee & St. Paul Railway at Boone. Shortly thereafter he was appointed chief clerk to the division freight agent of the latter road at Des Moines, serving in this capacity until 1904. In that year he resigned to become chief clerk to the division freight agent of the Chicago, Rock Island & Pacific Railway at Des Moines. He was subsequently advanced to the position of commercial agent of the road at Des Moines, but resigned after a short term of service to join the Fort Dodge, Des Moines & Southern Railroad as general freight and passenger agent at Boone. In March, 1911, he was promoted to traffic manager. In October of the same year he was made general manager of the company.

Wisconsin Association Elects Mr. Lounsbury

William C. Lounsbury, general manager of the Superior Water, Light & Power Company, Superior, Wis., was elected president of the Wisconsin Electrical Association at its meeting at Milwaukee on March 25. Mr. Lounsbury had served as the association's president during the greater part of last year. When Raymond C. Smith, who was chosen president a year ago, resigned last June on removing from the State, Mr. Lounsbury, as first-president, was advanced to fill the vacancy.

Mr. Lounsbury's fine sense of humor was well demonstrated by the able and pleasing manner in which he presided over the meeting of the association recently. This sense of humor may also be seen in what follows, which is the result of a request made upon him for the details of his training and experience. He is quoted verbatim, for a man's autobiography is not often so readable as his. This is what Mr. Lounsbury has to say about himself:

W. C. LOUNSBURY

I was born, through no fault of my own, on Friday the thirteenth day of February, 1880. After a few years, most of which I presume were spent in making as much noise as possible, I was taken under protest to Boston at the age of five and subsequently lived there long enough to receive as much public school education as is ordinarily given. After some strenuous effort I was graduated from the Massachusetts Institute of Technology in 1904. The subsequent few years were spent in Worcester, Washington and New York, doing what I then thought was extremely valuable work for my employers. This I have since found to be quite contrary to facts, but there is no doubt it was profitable to myself.

Coming to my present company some thirteen years ago, I made a very creditable record in lessening costs in the water department and in connection with the construction work, over which I had general charge. In 1912 I was made general superintendent, with supervision over the operation of our water, gas and electric departments. Since 1918 I have been general manager.

I have the honor of paying dues to the National Electric Light Association, American Water Works Association, New England Water Works Association, American Public Health Association, and for some reason still a mystery to me I was elected a fellow in the American Association for the Advancement of Science. I have been more or less active in several Wisconsin State associations, including the Wisconsin Society of Engineers and the Gas & Electric Association. I am a member of the local Rotary Club and for several years have been a member of the Superior Park Commission, serving as its president in 1917 and again this year.

Obituary

Francis S. Williams, for a number of years connected with the legal department of the Interborough Rapid Transit Company, New York, N. Y., died on April 1.

A. N. Hargrove, formerly foreign sales manager of the J. G. Brill Company, died suddenly on March 27, in Philadelphia. Mr. Hargrove joined the Brill staff in 1905 and was widely known in the export trade. He was forty-one years of age.

Richard D. Simms, treasurer of the Capital Traction Company, Washington, D. C., died suddenly on March 31, at Asheville, N. C. Mr. Simms was commander of the District of Columbia National Guard, with the rank of brigadier-general. He was born in Washington fifty-one years ago. For twenty years he was employed by the District of Columbia. In 1905 he resigned his position as purchasing agent of the district to become treasurer of the Capital Traction Company. He was active in the affairs of the National Guard for many years. Joining that organization twenty-three years ago, he was made a major in 1899 and in 1909 was promoted to colonel. He retired in 1911.

G. A. Humphrey, superintendent of shops of the Sacramento Northern Railroad, Sacramento, Cal., died on Feb. 26. Mr. Humphrey was born in England in 1851. Coming to the United States at the age of sixteen years, he went to work for the Missouri Pacific Railroad as an apprentice in the mechanical department. He remained in the employ of the Missouri Pacific for more than thirty years, serving successively as mechanic, car builder and master mechanic. He later worked for the Père Marquette System as master car builder. He joined the Sacramento Northern Railroad as superintendent of shops in 1907.

Thomas J. Nicholl, who for many years was vice-president and general manager of the old Rochester (N. Y.) Railway is dead. Mr. Nicholl had made his home in Rochester for several years before his death. He was seventy-four years old. Mr. Nicholl was born in England, the son of Thomas E. Nicholl, who was associated with Sir I. K. Brunnel in the construction of the Great Western Railway of England and later assistant engineer in the construction of the Grand Trunk lines in Canada. Mr. Nicholl was the first member of the first Street Railway Young Men's Christian Association. He was associated with many of the big steam railways before taking charge of the Rochester traction lines and the Rochester & Sodus Bay Railway. He was a brother of H. A. Nicholl of Anderson, Ind.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Insulation Material Prices Higher

Cotton and Silk Goods and Varnishes Higher by from 5 to 20 Per Cent—Shipments Long

Insulating materials are characterized by longer shipments and higher prices. Spot cotton in New York is quoted at 42.50 cents. Prices on cotton webbing, tape, tubing, varnished cambric and friction tapes advanced the last week in March about 5 per cent. The demand for cotton insulations is heavy and shipments from the factory are about three months. Finishing mills are hard put to it to get yarns for electrical uses because of the heavy demands on this material from other sources.

The automobile industry is using greater and greater amounts of long staple cotton in the manufacture of cord tires and in the upholstering and in tops. Consequently the electrical trade feels the reaction in higher prices and longer deliveries. At the same time labor turnover in the mills is rather too rapid for economical operation.

Varnished silk cloth and tape is reported 20 per cent higher than two weeks ago. Shipments are in general longer than for cotton goods because of a greater shortage of the semi-finished product. One producer of silk insulation is still shipping on orders of last June.

Within the last ten days insulating varnishes have advanced about 5 per cent.

Railways Face Long Deliveries on Insulators

Increased Export Demand and Malleable Shortage Responsible for Present Conditions

As the result of heavy ordering of high tension insulators by foreign interests and unimproved factory conditions in the malleable industry, railways now entering the market are being quoted from four to seven months on large orders of high tension insulators.

Large orders are coming from outside the country and payments are being made on the basis of cash on bill of lading, although some European countries are seeking longer terms. Italy and France are active in this field. The high cost of fuel in these countries is undoubtedly a great factor in the expansion of high-tension lines at this time. An order of 70,000 suspension units is being filled for shipment to Japan, for operation on 154,000 volts. It may be interesting to note here that an order for 10,000 units for this development has been placed in Japan. Among the orders for South America is one for 30,000 units of the 70,000-volt suspension type, destined for the Andes. Inquiries, too, for export trade are received in good volume.

Railways and power companies are ordering for maintenance purposes except in a few instances where extensions are being made.

These orders, however, are running into good volume as is witnessed by the long shipping dates quoted. These orders are increasing in volume and number and from the inquiries coming in give evidence of much work under contemplation.

Manufacturers of high-tension insulators have their hands full taking care of orders for shipment during the next six months. In general quotations are being made on a basis of shipment in four to six months, but there is still a certain amount of capacity, small, it is true, which can be turned over to care for special rush orders by moving ahead short time orders on which a slightly longer shipping date would make no difference to the buyer.

Factory production is reported at a little higher rate than earlier in the year. Labor is still regarded as the controlling factor in production, and its turnover is still rather high. Malleable shortage is giving considerable trouble in some plants, although at least one manufacturer reports a good supply coming from the foundry which has been his source for a good many years.

Prices on high-tension insulators were advanced from 10 to 20 per cent by at least one manufacturer, while others have reported no advance since early in the year.

1,376 Safety Car Equipments Ordered During First Quarter

Number of Equipments for First Three Months of 1920 Practically Equivalent to Number of Safety Cars for All of 1919 — 25 Per Cent of Railways Have Purchased Safety Cars

Safety car sales continue with a rush. Insistent increased demand from all sections of the country has resulted in the placing of 1,376 sets of safety car equipment during the months of January, February and March, 1920. This is one-half of one per cent less than the total number of safety cars ordered during the entire year, 1919.

Recent estimates made by electrical manufacturers, carbuilders and others place the number of safety cars to be built during the year at from 3,000 to 4,000 and the above total for the first quarter is conclusive evidence that these figures are conservative.

According to reports received from three of the four carbuilders who are manufacturing safety cars, production schedules are being increased and standard cars are being turned out as fast as they can be built regardless of the number on order. Lack of certain much-needed material, including sheet steel and equipment such as motors, control and airbrakes, is the only drawback which might seriously curtail production.

The purchasing power of the railways is another important factor which will directly affect production this year. At present, however, under the car trust certificate plan, purchases of safety cars are more easily arranged than for any other type. This is partly due to the marked economies that have been shown in the operation of safeties.

Rapid Increase in Sales

Production of safety car equipments was commenced during 1916 and in that year forty-nine sets of equipment were ordered. This must not be confused with apparatus used on many so called one-man cars which were not safety cars. Only those cars are included which were equipped by the Safety Car Devices Company. In 1917, 520 sets of equipment were ordered and 518 during 1918. Of course, both of these were war years and the railways bought fewer equipments than during a normal period. Last year, 1919, showed an increase in sales of equipments of about 240 per cent over 1918, a total of 1,791 sets of equipment having been ordered during the

SAFETY DEVICES ORDERED SINCE 1915

	1916	1917	1918	1919	First Quarter 1920
Equipments	49	520	518	1791	1376
Safety Cars	187	280	644	1383	*545
Number of Railways	41	44	52	100	70

*Safety cars ordered during January and February, 1920.

year. The difference between this number and the total number of safeties for 1919 represents the equipments ordered by manufacturers for future delivery and also those equipments which have been placed on old cars, reconstructed in the railways' shops.

No estimate has been made for the number of sets of equipment for the entire year 1920, but if the pace which has been set so far continues throughout the year, more than 5500 sets will have been ordered by Jan. 1, 1921. Up to the present time more than 200 different railways in the United States, Canada and Cuba have placed orders for safeties, showing the duplication of railways ordering this type of car to be about 33⅓ per cent. According to the latest McGraw Electric Railway Directory, dated February, 1920, there are now in operation 798 trolley and third rail properties in addition to the cable, storage battery, gas-electric and electrified steam lines. Hence, at this time more than 25 per cent of the railways on which it is possible to operate safety cars already have in operation or have purchased this type of equipment.

Rolling Stock

Chautauqua Traction Co., Jamestown, N. Y., recently lost a snow-plow and a freight car in a fire at Stow, N. Y.

Beloit Traction Company, Beloit, Wis., according to reports has placed an order for two safety cars.

Pennsylvania & Ohio Railway, Ashtabula, Ohio, is reported in the market for ten city cars.

Sunbury & Susquehanna Railway, Sunbury, Pa., is reported to have purchased several cars.

United Railways, St. Louis, Mo., through its receiver, Rolla Wells, has asked permission to spend $2,000,000 for the purchase of 160 new cars.

Iowa Railway & Light Company, Cedar Rapids, Iowa, is reported to have placed an order for six safety cars.

Franchises

Knoxville Railway & Light Company, Knoxville, Tenn. — The Knoxville City Commission has granted the Knoxville Railway & Light Company a franchise for a line in Jessamine Street and Pratt Avenue.

Track and Roadway

Edmonton (Alta.) Municipal Street Railway. — This company will install 7,000 No. 2 ties.

British Columbia Electric Railway, Vancouver, B. C.—The British Columbia Electric Railway plans to construct a new line at a cost of $25,000.

Sacramento Northern Railroad, Sacramento, Cal.—The Sacramento Northern Railroad is building a siding ½ mile in length in West Sacramento.

Sacramento Northern Railroad, Sacramento, Cal. —The Sacramento Northern Railroad will build a standard gage single-track line with overhead trolley system from its branch track in Yolo County, Cal., to serve the mills and warehouses along the Sacramento River.

Illinois Traction System, Peoria, Ill. —The Illinois Traction System is contemplating the installation of 20 miles of additional track circuit signal.

Dauphin, Man. — The municipality of Dauphin plans to build a railway line.

Eastern Massachusetts Street Railway, Boston, Mass.—The Eastern Massachusetts Street Railway plans to extend its line in Water Street, Lawrence, Mass.

Eastern Massachusetts Street Railway, Boston, Mass.—The Eastern Massachusetts Street Railway will repair the tracks of its Quincy division at a cost of $130,000.

Eastern Massachusetts Street Railway, Boston, Mass.—The Eastern Massachusetts Street Railway will rebuild 25,000 ft. of track in Fall River, Mass. It is planned to expend approximately $140,000 on the work.

Columbus Railway, Power & Light Company, Columbus, Ohio.—Under the terms of an ordinance which became effective on April 3, the Columbus Railway, Power & Light Company must spend $2,400,000 on track extensions and other improvements within the next six years.

Philadelphia (Pa.) Rapid Transit Company. — The Philadelphia Rapid Transit Company proposes to build a line through Adams Street, the Boulevard, Courtland Street, Windrim Avenue, Twentieth Street and Wingohocking Street, Philadelphia.

Steubenville & Wheeling Traction Company, Wheeling, W. Va.—The City Council of Steubenville, Ohio, has passed an ordinance under which the Steubenville & Wheeling Traction Company will be required to relay its tracks on Third Street, Steubenville.

Power Houses, Shops and Buildings

Los Angeles (Cal.) Railway — The Los Angeles Railway has begun work on a ten-story office building at the corner of Broadway and Eleventh St.

International Railway, Buffalo, N. Y. —A carhouse, eight passenger cars, three snow-plows and a sweeper belonging to the International Railway were destroyed by fire on March 21. The loss is placed at $60,000.

Toledo Railways & Light Company, Toledo, Ohio.—A substation belonging to the Toledo Railways & Light Company was destroyed recently, the loss amounting to $50,000.

Niagara, St. Catharines & Toronto Railway, St. Catharines, Ont.—The Niagara, St. Catharines & Toronto Railway plans to make extensive improvements in the St. Catharines district during 1920. The construction program calls for a total expenditure of $500,000. The plans include the erection of a new car shop at St. Catharines, to cost $50,000.

Trade Notes

Southwestern Engineering Company, Hutchinson, Kan., has opened a branch office at Fort Worth, Tex., with Harvey R. Rankin in charge.

Hydraulic Pressed Steel Company, Cleveland, Ohio, announces the consolidation of all of its interests under the name of the Hydraulic Steel Company of Cleveland.

Horace L. Fritschle has been placed in charge of the Chicago office of the Square D Company, at 431 South Dearborn Street, Chicago. Mr. Fritschle was formerly located in St. Louis.

Edward M. Burd and William C. Giffels have opened an engineering office in Grand Rapids, Mich. Both are University of Michigan graduates and were formerly connected with the Consumers' Power Company, in Michigan.

E. P. Palmer, formerly resident engineer of the Rapid Transit Subway Construction Company, has become associated with Warren, Moore & Company, New York City, as engineer directing the company's contracts in the New York territory. As captain of Engineers he served in France in the Transportation Department, A. E. F.

Metal & Thermit Corporation, New York, N. Y., has appointed James G. McCarthy, manager of its Canadian branch, with headquarters in Toronto, and has transferred Robert L. Browne from the New York office to Boston. Mr. Browne is to have charge of sales in New England States.

Clarence Goldsmith, who has been on the engineering staff of the National Board of Fire Underwriters, 76 William Street, New York City, for the past twelve years and late a major in the Construction Division of the United States Army, has been placed in charge of the branch engineering office recently established by the National Board at 234 South La Salle Street, Chicago, Ill.

W. A. Lodge is now connected with the Bussmann Manufacturing Company, St. Louis, Mo., in the capacity of research engineer. He will be in full charge of the engineering department, devoting his time to research and the technical development of the Buss fuse. Mr. Lodge has for the past four years been with the Underwriters' Laboratories of Chicago as research engineer. Previous to his connection with the Underwriters' Laboratories, he was professor of electrical engineering in two universities in the United States and Canada.

Inquiry 32,389.—A firm of merchants in Italy desires to purchase and to secure an agency for the sale of electrical supplies, etc.

Inquiry 32,372.—A company in India desires to be placed in touch with dealers and manufacturers of electrical supplies.

D. & W. Fuse Company's name has been changed to the D. & W. Fuse Works of the General Electric Company, Providence, R. I.

Union Insulating Company, Parkersburg, W. Va., is planning to erect a new plant, 80 ft. x 216 ft., to cost about $100,000.

Hazard Manufacturing Company, Wilkes-Barre, Pa.: A booklet giving a general description of the manufacture of its rubber-insulated wire.

Crescent Insulated Wire & Cable Company, Trenton, N. J., has awarded a contract for a three-story addition to its plant, 50 ft. x 150 ft., on North Olden Avenue, to cost about $40,000.

Westinghouse Lamp Company, New York, N. Y., has awarded a contract for the construction of an extension to its factory at Milwaukee, Wis., to cost about $400,000.

M. B. Austin Company, Chicago, Ill., announces that the Factory Mutuals Fire Insurance Companies have approved Trico renewable fuses in all capacities up to 60 amp., 250 volts.

Ideal Electric & Manufacturing Company, Mansfield, Ohio, is planning to increase its factory facilities materially this summer and to extend its standard line of machines to include also synchronous machines.

Charles F. Overly has recently been appointed general manager of sales of the Structural Tool Company, Cleveland, Ohio. For years Mr. Overly was connected with the manufacture of pneumatic tools and formed the Overly Industrial Tool Company.

W. E. Herring, formerly Pacific Coast industrial agent of the Puget Sound Traction, Light & Power Company, Seattle, Wash., has been transferred to the engineering department in the Boston office of Stone & Webster. Mr. Herring formerly was chief engineer of the United States Forestry Service.

Brown Instrument Company, Philadelphia, Pa., manufacturer of pyrometers, thermometers, tachometers, indicating and recording instruments, is erecting two new buildings, one for the manufacture of recording thermometers, the second for a research department, at a cost of $100,000.

Kentucky-West Virginia Engineering & Electric Company, Ashland, Ky., has been organized to do a general engineering construction business, utilizing an armature and machine shop and engaging in wholesale and retail sales of electric supplies. Thompson Pierce of Bluefield, W. Va., is president; C. Biddison of Ironton, Ohio, vice-president and R. F. Carpenter of Ashland, Ky., secretary and treasurer.

Electrical Manufacturers' Export Corporation, New York, N. Y., was recently incorporated in New Jersey as a holding company of the Electrical Manufacturers' Export Association, a New York association. Capitalization is given as $100,000. The association has offices in fourteen principal cities of both hemispheres and is opening up three more offices. It acts in the interests of American electrical manufacturers only.

Edward P. Sharp, Buffalo, N. Y., manufacturer of the Ideal trolley wheel, has sold the business to L. E. Harmon, who will continue to manufacture the Ideal trolley wheel which was designed, manufactured and sold by Mr. Sharp for the past twenty years. The shop will be moved from its present quarters on Elliott Street to 308-314 Terrace in Buffalo, where better and more suitable quarters have been secured for manufacturing purposes.

Herbert Rice, who has been a member of the sales organization of the Cutter Electrical & Manufacturing Company and who has for some years past been its general sales manager, has resigned to enter the real estate business. Harry F. Darby, who was for many years in charge of the Cutter Company's Chicago office and who more recently has been sales manager of the Ward Electric Vehicle Company, will rejoin the Cutter organization as sales manager with headquarters in Philadelphia. These changes are effective about April 1.

Rome Wire Company, Rome, N. Y., has recently authorized an increase in capital stock to $4,000,000 7 per cent first preferred and $5,650,000 common, the shares in each issue being $100 par value. Kidder, Peabody & Company of New York and Boston are offering to the public $1,400,000 of the preferred issue. The proceeds of the sale of $1,400,000 of preferred stock will furnish additional working capital to care for the growth of the plant in Rome and to pay for plant and carry on the business of the Diamond branch of the Rome Wire Company in Buffalo, N. Y. The total quick assets of the company amount to $3,997,680, and the company's surplus is $2,033,118.

Charles C. Phelps recently became associated with the Uehling Instrument Company, 71 Broadway, New York City, combustion engineer, as well as manufacturer of CO_2 recording equipment and other fuel economy apparatus. He is devoting most of his attention to research work in connection with the efficient combustion of fuel oil in boiler furnaces. Mr. Phelps, a mechanical engineer from the Stevens Institute of Technology, has spent several years studying power-plant problems and for five years of this period he was connected with the Ingersoll-Rand Company, manufacturer of power-plant fective as of April 1.

New Advertising Literature

Star Brass Works, Chicago, Ill., manufacturing engineers, 3114-28 Carroll Avenue, Chicago: A twenty-four-page bulletin, No. 4-A, covering spray-cooling equipment for the cooling of water from steam and ammonia condensers.

Sanford Riley Stoker Company, Worcester, Mass.: A 48-page second edition of its general catalog on "Riley Underfeed Stokers," which describes every phase of stoker operation. Several pages of valuable engineering data are also contributed by the company's service department.

Locomotive Superheater Company, 30 Church Street, New York, N. Y.: Bulletin T-5, covering the use of superheat steam in operating engines and steam turbines. It contains "steam consumption" curves and "superheat" curves for various types of steam prime movers.

Benjamin Electric Manufacturing Company, New York, N. Y.: Bulletin No. 15, describing the Benjamin dome reflector, R-L-M standard, for shop lighting. Bulletin No. 17 covers its different methods of industrial lighting and gives illustrations of its different reflector units, etc.

Green Fuel Economizer Company, Beacon, N. Y.: A 44-page, illustrated bulletin, No. 152, on "Hi-Efficiency, Hi-Speed Radial Flow Fans—Forced Draft Service." The development and design, pressures and capacities developed of these fans are all fully described. Added are twelve pages of dimension sheets and nineteen pages of capacity tables.

Federal Machine & Welder Company, Warren, Ohio: Bulletins describing different types of its welding machinery as follows: Bulletin No. 31 covers Federal electric butt welders, Bulletin No. 32 Federal junior type spot welder, Bulletin No. 33 Federal "Universal" spot welders, Bulletin No. 34 Federal butt welders, and Bulletin No. 35 Federal No. 22-A electric tube welder and roller.

B. F. Sturtevant Company, Hyde Park, Boston.: A sixty-page illustrated catalog, No. 264, covering its motors from fractional-horsepower sizes up to 50 hp. Generators up to 600 kw., steam-turbine sets, gasoline-engine generating sets, commutating pole turbo-generators, inverted rotaries, balancer sets, propeller fans and many special applications of electrical apparatus are illustrated and described.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.: Annual catalog of electrical supplies for 1920. The book is cloth-bound, contains 1,456 pages and is thumb-indexed. A general outline of the company's industrial motors, controllers, railway equipments and power and marine machinery is also included. This catalog replaces all catalogs issued heretofore on details and supplies.