

# Electric Railway Journal

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## This Should Be a Frequent Experience

IN AN editorial printed last week the attitude of this paper toward "standing in" with the newspapers was explained. The relations of railway managers with the newspaper publishers, editors and reporters should be friendly, nay, even cordial, but there should be no surreptitious and mysterious friendliness which might justly breed suspicion. At the same time relations with the newspapers are very important, and there must be some plan or plans for giving the newspaper men the facts. A certain newspaper "somewhere in America" had consistently and persistently belabored the local electric railway. The manager felt that the facts of the case were only superficially understood by the editors, but he was at loss to know what to do. At last he convinced the newspaper men that they ought to make a careful study of the property and to learn at first hand what was being done to improve the conditions of which they complained. The result was, as could be predicted, a much more helpful and constructive attitude toward the utility. If this were an isolated instance it would not be significant. It isn't, but it could be more typical. Any live editorial staff should be willing to familiarize itself with the operation of such an essential to the welfare of the community as is the electric railway.

## More Women Must Be Used in Electric Railway Service Next Year

NEW YORK seems to be the first city after all in which women will be employed in train operation in this country. The Brooklyn Rapid Transit Company has already put women in service as train guards, and the New York Railways is advertising for women to act as conductors on pay-as-you-enter cars. If the trials prove successful, and there is no reason why they should not be, women will undoubtedly be very generally employed in electric railway service. The need for providing some substitution for man power grows increasingly evident as this country gains a greater appreciation of what the present war means to it. If we are not to suffer from unpreparedness in this particular in 1918 as the country suffered from general unpreparedness during the years before the war, the electric railway industry must act promptly in this matter. If the war continues into the middle of 1918, as appears inevitable, there is bound to be a shortage of labor far greater than exists to-day, when the country is only about at the beginning of its war preparations. Two factors make this condition inevitable. The first is that some 2,000,000

men will be withdrawn from production to serve actively with the military and naval forces of this country. The other is that a vast army of men will be required in the industries at home to provide the ships, the munitions, the steel and the other necessities of modern war and of the men in the field. We must produce during the coming year practically all of the goods for ourselves and our allies to be purchased by the billions of money appropriated by Congress for the prosecution of the war. Electric railways, therefore, owe it to the country as well as to themselves to conserve their use of the man power of the country so far as they can and yet keep up that transportation service which is directly necessary for the government and for the communities in which they operate.

## Women Are Better Than Men for Some Work

THE experience in Great Britain both in railway and manufacturing work since the beginning of the war has shown conclusively that women rapidly become skilled in the work to which they are physically and mentally adapted and that the range of this work is far greater than formerly was considered possible. The ability of women to learn thus quickly does not mean, however, that special training is not necessary. In fact, women on the car or in the shop or office should receive not only the same training that the average man would require to fit them for the work, but they should usually receive more training because most women are not accustomed to the discipline of continuous work at regular hours. Nevertheless, when this training has been acquired, female labor, within its range of occupations, possesses some advantages over man labor. Thus the testimony of employers abroad is that in all creative work women seem to take a special pride in good workmanship. They also take their jobs more seriously than many men, a fact which is due perhaps to a desire not to move from one position to another. Of course in anything which pertains to the housekeeping part of a commercial business, and there is very much of this work on an electric railway system, they possess especial qualifications. Such work on an electric railway property would include not only cleaning of cars and stations but the maintenance of records, ticket selling and clerical work of all kinds. A paper read at the last meeting of the New York Railroad Club on Nov. 16 showed that the Pennsylvania Railroad Lines East had on Sept. 1 of this year 3730 women in its service as compared with only 1494 on May 1. The author of the paper, a Pennsylvania Railroad official, estimated that the figures for October

would be 35 per cent in excess of those of Sept. 1. The paper showed that the usefulness of woman labor is spreading rapidly in steam railroad service and to many lines of work which one does not usually associate with women, such as storeroom attendants, block signal operators and bridge tenders.

### Let's Demonstrate the Possibilities of Electric Freight Haulage

**T**HE conference of representatives of the different transportation interests which Daniel Willard as chairman of the advisory commission of the Council of National Defense expects to call at Washington within the next few weeks, promises a means of helping to solve the present transportation problems of the country. The steam railroads are admittedly overloaded with freight, owing to the war activities, and while some relief can be obtained by a liberal policy of rate raising and other alleviating legislation, the nation now needs all the assistance which other transportation agencies can supply. These other agencies consist of the electric roads, highway vehicles (particularly motor trucks) and the waterways. Each has its merits and its advocates. What can each do to help haul some of the freight and what will be the cost?

Obviously the best plan is to make a scientific study of the possibilities of each system of transportation and of the requirements of each to bring it to its greatest practicable efficiency. In some instances undoubtedly the motor truck will be found to be most economical, in others the electric railway, and in still others, at some seasons, the inland waterway. Let the representatives of each system at the conference state the controlling factors of each means of transit and the relief, legislative or otherwise, which it requires to do its share. Steps can then be taken, under federal authority if necessary, to secure needed relief. It is clearly undesirable to parallel by motor trucks and expensive highways an electric road when the latter is able by slight or no additional expense to furnish as good or better service, if only an obstructing charter provision against the haulage of freight can be removed. On the other hand, where there are no electric railways or where, owing to transshipments, the cost of motor truck transportation is less expensive the latter should be chosen.

Very few people among the general public realize the immense possibilities of electric freight transportation. Yet this country is literally gridironed north of the Potomac and Ohio, and east of the Mississippi, with electric railway tracks whose capacity for the haulage of light freight and even of standard freight cars is far from being utilized. We believe the Electric Railway War Board is the best means which the industry has of bringing this fact to the attention of the authorities at Washington. This board has an opportunity at this time to perform a great service both to the country and to the electric railways by emphasizing the value of electric freight haulage at the coming conference.

### Automatic Control Takes Another Step

**T**HE control of the hydroelectric generating station by automatic means is a logical outcome of success with the automatic substation, as it affords another opportunity to reduce operating labor. The idea of such control seems to have been original with E. W. Allen and Edward Taylor of the General Electric Company, inventors of the automatic substation. In the case of the Cedar Rapids installation, described elsewhere in this issue, there was a small hydroelectric site right at hand which could be used advantageously as an auxiliary by the central station company, although it could not be made to earn a very attractive return under normal operation on the investment necessary to develop the project. With a labor charge of about \$3,600 a year eliminated from the annual operating expenses of the plant, however, reasonable return on the investment could be earned. Accordingly, the water power has been developed with automatic control. Practically, the only charge which the company has now to meet in return for a supply of about 4,000,000 kw.-hr. a year of energy is the interest on an investment but little greater than that involved in an average ordinary 2000-kw. water-power plant.

An interesting feature of the control as arranged at Cedar Rapids is the remote supervision from the steam station over the automatic equipment. This makes it possible for the operator at the steam station to add, in the short period of thirty-seven seconds, from 500 to 2000-kw. capacity to his generating facilities, depending on how many of the units are already running, and this with not more than one second's attention from himself. He has simply to throw four small switches on the benchboard and all the hydroelectric machines come in on the line and pick up the load to their full capacity. It is also possible by this remote control to shut down machines and thus to store up water for greater use at certain times. If left to its own purely automatic control, the station will keep as many machines on the line as the flow of the river will permit.

Two features of the automatic control as installed in the first station would seem to offer an opportunity for possible trouble. While two exciters have been installed, any trouble developing in the one in use will shut down the entire station, since the other cannot be used until a manually-operated, double-throw switch at the station is thrown to the opposite position. This, of course, would require the plant to be out of commission during the time necessary for an operator to go from the steam station to the hydraulic plant. Another cause of shutdown might be a failure of the speed-limiting device which protects all machines and for which no duplicate has been provided. Any trouble here would require shutting down the entire plant until the device could be repaired, or presumably the plant could be operated by cutting out the speed-limiting relays and running the machines at the risk of overspeed. However, these two circumstances are remote possibilities, as both the exciters and the speed-

control device are rugged, dependable machines, and in addition the steam station has ample reserve capacity readily to absorb the extra load, so that it was not thought necessary to complicate the mechanisms by providing equipment to guard against these possibilities.

## An Encouraging Note

### Is Sounded for Railway Men

COMING as they do from the chairman of the Massachusetts Public Service Commission, one of the foremost regulatory bodies in the country, the words of F. J. Macleod before the New England Street Railway Club last week ought to be very encouraging to the electric railway industry. As shown elsewhere, his remarks are based upon a sympathetic understanding of electric railway economics and electric railway burdens. For instance, he says that depreciation should be better provided for, but that the question of depreciation and the question of fare must go together. This is a clear recognition of the public's as well as the utility's responsibility for the insuring of continuous, efficient and paying service.

And in regard to the priority of depreciation charges or dividends when the income is not sufficient to provide for both, Mr. Macleod pointedly states: "I see no escape from the conclusion that dividends must also be provided in sufficient amount to enable the company to preserve its credit and to go forward in making the improvements and extensions that are absolutely demanded." This is not an assertion that dividends are paramount but that they are on a par with depreciation charges. The public should provide for one just as much as for the other, and neither the physical property nor the stockholders should be forced to bear the burden of the public's shortcomings. The responsibility of the commissions in seeing that the public pays fully for what it gets—that is the crux of the electric railway situation, and we are glad that Mr. Macleod seems to realize it.

Furthermore, we have been interested to note Mr. Macleod's assertion that there must be a considerable degree of experimentation with different methods of fixing fares before one can be sure that in the case of any particular property the maximum revenue result is reached. We have said before, and we repeat it even more strongly, that not even electric railway men know exactly what methods of increasing fares are to be preferred for individual cases. Just how far the distance factor can be introduced, either on a straight-mileage or a graded-zone-system basis, is a question that demands a most searching investigation by electric railways themselves. The commissions have been and will continue to be intensely concerned with this very question, but electric railway operators should be men enough to think for themselves, although quick to co-operate with the commissions.

The utterances by Mr. Macleod, and also encouraging statements by William C. Bliss, chairman Rhode Island Public Utilities Commission, may well be said to mark the beginning of a new era in the New England transportation field—an era in which, we hope, the electric

railways will be restored by commission and public foresightedness to their position as prosperous civic developers. But, as Mr. Brush says, the commissions should not be asked to do all the work of rate regulation. They can grant higher fares, but it is not their duty to convince the public of the fairness of their decisions. This the companies must do through intelligent, persistent publicity, not because the commissions will be so cowardly as to be governed by popular clamor rather than impartial judgment, but because the public, if it imagines that it is being unjustly treated, will go behind the commissions to the legislatures for political relief. It is for this reason that the eyes of the public must be opened, its prejudices removed, its misunderstandings corrected. And this work is entirely up to the railways themselves.

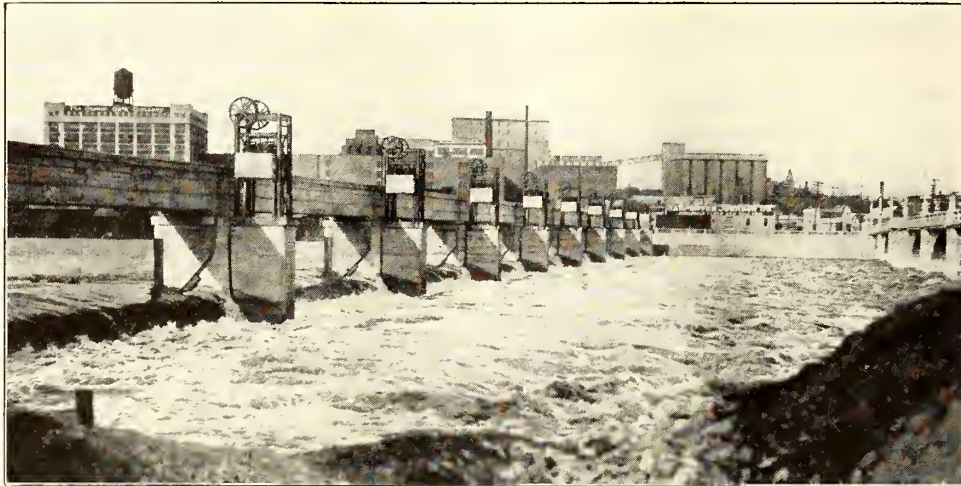
## Progress of the

### Front-Entrance Center-Exit Car

AMONG the promising developments in electric railway rolling stock the new type of car in which the passengers enter at the front and pay as they pass the conductor located just forward of the center or exit door is worthy of special notice. Enough cars of this type are now in use to warrant the drawing of a few general conclusions. A representative of this paper has just made a study of the transportation conditions in several cities where they are in operation and finds roughly as follows: The application of the general principle of increasing the prepayment space has greatly improved loading speed; in fact, a crowd of boarding passengers streams into the car with gratifying celerity. In general the passengers are inclined to distribute themselves fairly well throughout the car, especially where cross seats are furnished in the rear. There is, of course, some tendency to remain in the entrance end but this is less, it would seem, than in other types of car. The loss of fares, through seizing of the opportunity to work off old transfers in the rush of emptying a crowded car at a congested transfer point in the rush hour, has proved not to be a serious evil. There are naturally many details of arrangement of ramps, stanchions, steps, heaters, etc., still in process of being worked out, but these do not affect the general principle. The tendencies as to these minor but important matters will be discussed in an early issue. The consensus of opinion, as far as we have been able to gather it, is unmistakably to the effect that as prepayment of fare at the car entrance was a step in advance of previous methods of collection, so, and for the same reason, the moving of the conductor to a point removed a reasonable distance from the entrance is another step in the direction of progress. There is no question but that the front-entrance, center-exit car and the one-man car provide, in their respective fields, at least a partial solution of the problem of "more service at less cost." It is fortunate that the new plan is being tried on new rather than remodelled cars. This fact permits the advantages of light weight, quick acceleration, low friction and safe, convenient step arrangement to be combined with those inherent in the conductor location.

# Automatic Power Plant at Cedar Rapids

Cedar Rapids, Iowa, Is Site of Pioneer Development—2000-Kw., Low-Head Generating Plant Operates in Parallel with 19,000-Kw. Steam Station a Short Distance Away—The Water Power Plant Control Is Completely Automatic but Provided with Remote Supervisory Control of the Automatic Equipment from the Steam Station



IOWA AUTOMATIC HYDROELECTRIC PLANT—CEDAR RIVER DAM

**A**UTOMATIC control of electrical machines, with which the electric railway field is now more or less familiar, and which thus far has been limited in its application to substations and other consumers of electrical energy, has now been extended to include the hydroelectric generating station. The pioneer installation is located at Cedar Rapids, Iowa, and is the joint product of the General Electric Company engineers and John M. Drabelle, electrical engineer Iowa Railway & Light Company. It comprises the control of a 2000-kw., low-head station constructed almost in the heart of the business district of the city, on the Cedar River, and arranged to operate in parallel with the Iowa Railway & Light Company's 19,000-kw. steam-generating plant, located about 3300 ft. farther up the river. The 2000-kw. capacity is made up of four 500-kw. units, of which three are already in operation.

The preliminary work on this installation was begun at about the time Taylor and Allen were working on the original installation of the automatic rotary converter substation on the Elgin & Belvidere Electric Railway (see *ELECTRIC RAILWAY JOURNAL*, Sept. 18, 1915, page 583). The plan as originally laid out was to operate the hydroelectric plant with remote control from the steam plant, in order to eliminate the necessity of employing an operator continuously at the hydroelectric plant. While a manually operated station could have been made to pay on the site occupied by the present plant, it would not have made an especially desirable investment. At a conference in Chicago, at which the General Electric Company engineers, including Mr. Taylor and Mr. Allen, and the company's engineers were present, it was brought out that remote control would not be particularly advantageous, principally for the reason that it involved too many compli-

cations and made possible too great an opportunity for an operator to err in controlling the station. It was believed that a completely automatic control might be developed, and upon further investigation it was shown that if sufficient engineering courage and ingenuity were to be had on the part of the railway company and the manufacturers, a saving of \$3,600 to \$4,000 a year in labor might result. William G. Dows, president of the railway and light company, later expressed himself in favor of the venture and work on the development began. An interesting sidelight in connection with the development of this plant is the fact that due to a rather liberal policy on the part of the manufacturer in absorbing much of the development charges necessary in working out the control layout, and also because of the exclusive use of standard apparatus in making up the control assembly, the actual investment in this first automatic generating plant is no greater than would have been required for a first-class manually operated station.

## GENERAL OPERATING FEATURES

As the station equipment is arranged and will usually be operated, the control of the machines will be handled remotely from the steam station, where the simple act of removing one small double-throw switch on a bench board will start the automatic control equipment at the hydro plant in its series of functions in placing a machine on the line, without further attention from anyone. These same switches on the benchboard, however, set in the opposite position, leave the number of machines running in absolute control of the automatic equipment at the hydro plant which is actuated by the level of the water in the storage reservoir. The conditions of load will not at any time determine the number

of machines cut on or off the line. It will simply be the practice to load the hydraulic plant up to the capacity which the water flow will allow, or which emergency requires, and the load fluctuation on the system will be taken care of at the steam station. If left to the purely automatic control, a lowering of the head beyond a certain level automatically cuts the generators off the line in a certain sequence and as many as necessary to keep within the water flow. And conversely, with a rising head the machines will start up and come in on the line as rapidly as the rise in water level permits. Any trouble whatever instantly cuts the machine or machines out and thus gives protection, regardless of the position of switches at the steam station, and then automatic-

ally brings them back on the line when conditions have become normal again. In brief, the complete control scheme includes a purely automatic control on which is superimposed a remote manual control. The former operates in accord with the water supply, while the latter causes machines to be cut in or out at the will of the steam plant operator, by means of the automatic equipment, regardless of water conditions.

As many machines will be run during the day through the remote control supervision as is possible and still permit the river to store up water for full-load operation of the plant during the night. This plan of utilizing the full flow of the river has been adopted as the one which best fits in with the load conditions on the system. The operation of all three units at the hydroelectric station permits the shutting down of one boiler at the power house during the night. This gives an opportunity to clean boilers and do repair work at the steam station, and still leave sufficient capacity to carry the night load, which includes the load brought on by interurban freight hauls requiring about 800 kw.

The hydroelectric plant provides an excellent safe-

guard against interruption on the system, especially in the daytime when normally only one or no machines would be operating, for they can very quickly be placed on the line to relieve the steam plant. For instance, if one of the large steam turbine units should lose its vacuum, the operator would simply have to push three levers on the hydroelectric control benchboard, and in thirty-seven seconds thereafter he would have 1500 kw. of hydroelectric capacity on the line and under load. Furthermore, after pushing these switches, he would not need to stand at the benchboard and wait for the hydroelectric plant to come in on the line, but could immediately rush to the vacuum pumps and assist in getting the steam turbines back on the line, the hydroelectric units taking care of themselves.

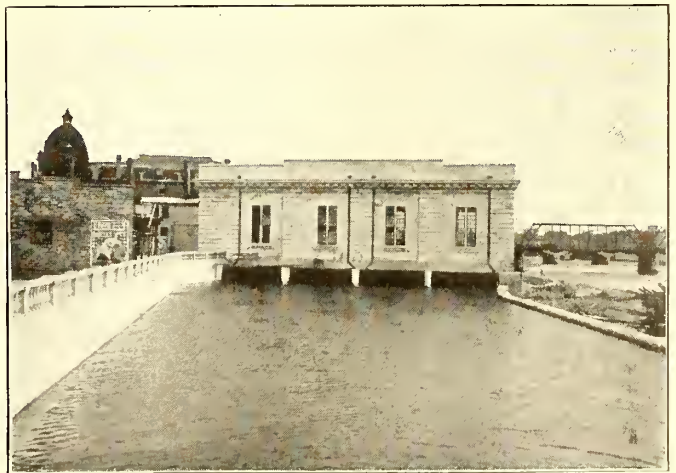
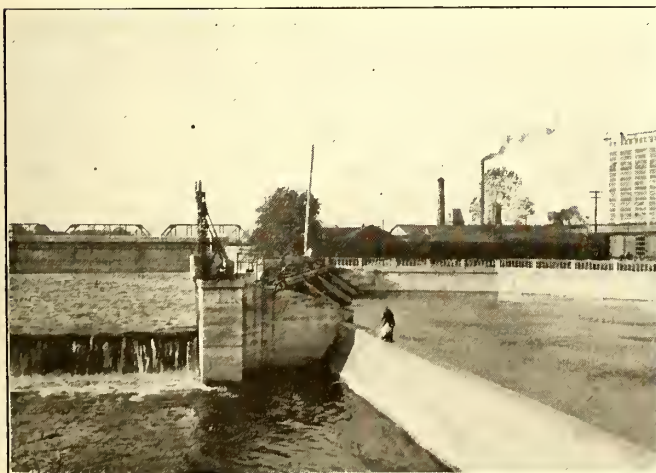
Another unusual advantage of the general system is the fact that by virtue of a constant excitation current in the fields of the hydroelectric machines it is possible to utilize a partially loaded unit to improve the power factor on the entire system. For example, if there is enough water flowing in the river to permit the operation of one machine at full load and to produce 100 kw. on another, full use can be made of the water available and of the full capacity of the windings on the second machine, by taking the control away from the contact-making ammeter and using the under-loaded, over-excited machine to absorb a large part of the wattless component of the system load.

#### SPECIAL FEATURES OF THE LAYOUT

The general arrangement of the power house and its location with respect to the river are not unusual. The interest in the plant lies principally in the selection and arrangement of the electric automatic control apparatus. Each machine with its water wheel and motor-driven control of the gate opening, and its electric control relays and contactors, form a completely separate



IOWA AUTOMATIC HYDROELECTRIC PLANT—FRONT ENTRANCE



IOWA AUTOMATIC HYDROELECTRIC PLANT—VIEWS SHOWING DAM, INTAKE FLUME AND SIDE VIEW OF POWER HOUSE

unit, with the exception of the field excitation supply. Excitation for all generators is supplied from either of two motor-generator sets which deliver a constant current without the interposition of Tirrill regulators, to the field coils of the several units. No instruments have been installed in the hydroelectric station, but rather have been placed on the control benchboard for this station located in the steam plant. All arrange-

ment system as readily accessible as it would be on any board, and yet places it out of sight.

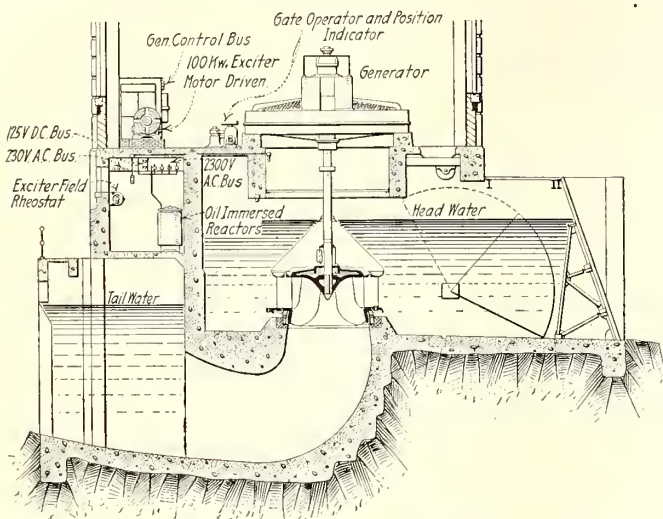
It is also of special interest to note that the plant does not contain any oil governors, since the gates are operated by motors which are controlled either automatically at the hydroelectric station or remotely from the steam station at the will of the operator located there.

RIVER CHARACTERISTICS AND HYDRAULIC EQUIPMENT

The Cedar River is about 600 ft. wide at the power station and is spanned by a concrete dam of the automatic crest type, and composed of nine spillway sections, each 60 ft. wide. The spillway in each of these sections automatically rises and falls with the flow of the river, giving an automatic flashboard effect. This was designed by the Fargo Engineering Company, Jackson, Mich. The intake canal to the power house is built almost at right angles to the spillway at the north end of the dam. The short flume is parallel to the river. The distance of the power house from the dam is but 350 ft.

The normal head of water at the station is 10 ft., with a variation between 8 ft. and 11 ft. Records taken of the river characteristics show that during 180 days of the year the average discharge is about 2100 cu. ft. per second. The lowest flow recorded is 500 cu. ft. per second, which occurred during four days in the year. About twelve or fourteen days in the year the river is at flood stage and the maximum flow is 50,000 cu. ft. per second. These flowage data indicate a regularity which is better than usual and is probably accounted for by the fact that the Cedar River has its source as far north as Minnesota and hence is supplied by a rather extensive watershed. Each water wheel in the plant takes water at the rate of 720 cu. ft. per second under full load.

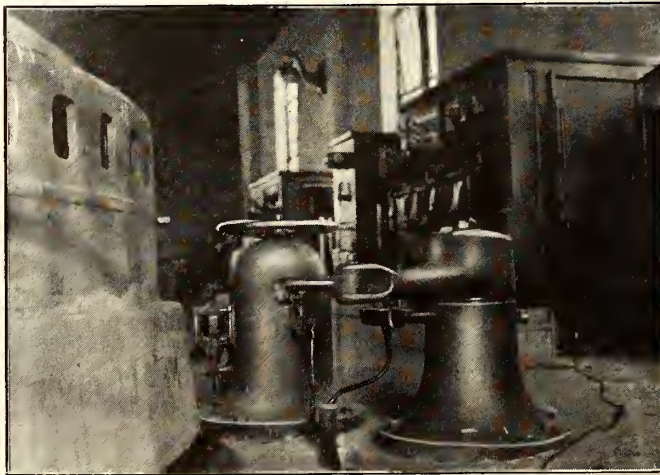
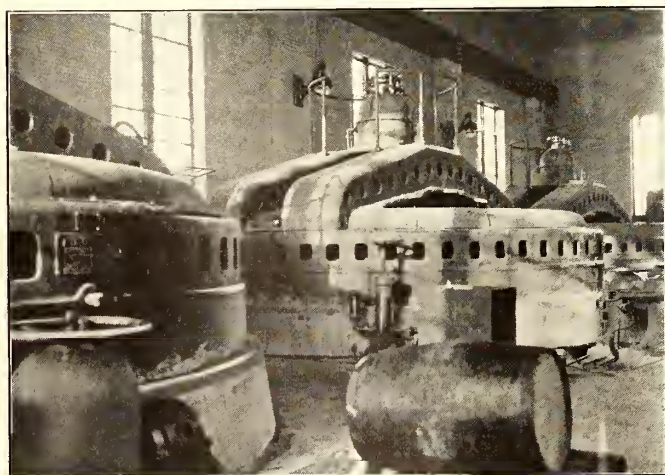
Standard trash racks and four tainter gates, each 20 ft. long, have been installed at the intake to the flume, which measures 100 ft. wide by 20 ft. deep. Each of these gates is driven by a 15-hp. motor. Each wheel pit at the power house is equipped with another 20-ft. tainter gate on the upstream side and stop logs on the downstream side of the turbine. While this provides for easy inspection, it does not complicate the layout or add much to the cost. Each wheel pit is a scroll case chamber, designed according to specifications of the



IOWA AUTOMATIC HYDROELECTRIC PLANT—GENERAL CROSS-SECTION

ments for switching in the hydroelectric station itself are entirely automatic. The connection between the two generating stations is thus made up of three groups of conductors, the power cables, instrument cable and control cable.

The striking feature of the station interior is its simple appearance. There is a single row of generators through the station, and opposite each is a cabinet in which the relays and switches for that unit are mounted. The few contactors and relays in view on the front of these cabinets do not give one the impression of any unusual amount of control apparatus. The use of switch cabinets rather than the usual paneled switchboard, and the construction of a bus chamber immediately below the cabinets, have made possible the impression of simplicity which one notices. This arrangement of the control apparatus has the advantage of making every element of the wiring and con-



IOWA AUTOMATIC HYDROELECTRIC PLANT—THREE 500-KW. MACHINES WHICH COMPRISE THE INITIAL INSTALLATION, AND GATE OPENING MECHANISM DRIVEN BY MOTOR BEHIND STANDARD

Allis-Chalmers Company, which company also designed the draft tubes.

The Francis single-runner type water wheels measure 171 in. in diameter and are rated at 540 brake horsepower at 60 r.p.m. with a 10-ft. head. This type of wheel was chosen because of the low speed necessary and in order to use direct-connected units. An 84-per cent efficiency of the water wheels was guaranteed by the manufacturer, the Allis-Chalmers Company. The thrust bearings on the vertical shafts of the machines are Allis-Chalmers plate type, which is a modified Kingsbury bearing. The oiling system on these bearings is actuated by a direct-connected pump on each unit. Uresel oil is used exclusively and this will need replenishing only about four times a year.

ELECTRICAL EQUIPMENT IN AUTOMATIC STATION

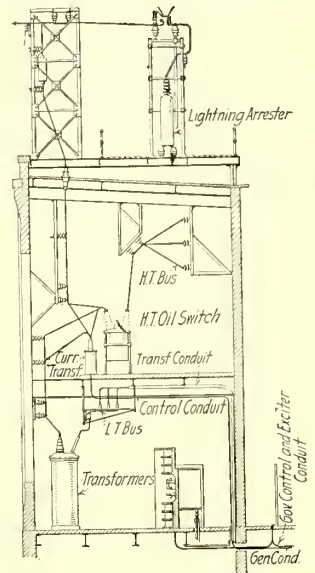
The three generators installed are Allis-Chalmers, two-phase, 60-cycle, 60-r.p.m., 2300-volt, vertical axis machines. Two-phase units were selected so that the station might be paralleled with the company's steam plant which still operates two-phase. The exciter sets which energize the generator fields are rated at 100 kw. at 125 volts. These are compound-wound, inter-pole generators, driven by 150-hp., two-phase, 60-cycle, 2300-volt, 1200-r.p.m. induction motors.

Two 3300-ft. two-conductor, concentric, 60,000-circ. mil, 2300-volt power cables connect the 2300-volt buses in the hydraulic and the steam plants. There is also a lead sheath cable containing ten No. 8 rubber-covered wires, running between the two stations for the instrument connections. Another lead sheath cable, containing fifty-two No. 12 rubber-covered wires runs between the two stations for carrying the control circuits. The control wires and instrument wires were placed in separate cables to avoid the possibility of a breakdown in one of the current transformers placing a high potential on the control circuits. Thirty-eight of the fifty-two wires in the control cable are used for light signals in indicating to the operators at the benchboard in the steam plant the positions of the gates. Without this indicating feature, only fourteen wires would have been necessary to carry out the complete control requirements. All cables between the two plants are laid underground to guard against lightning disturbances.

The control equipment at the automatic hydroelectric

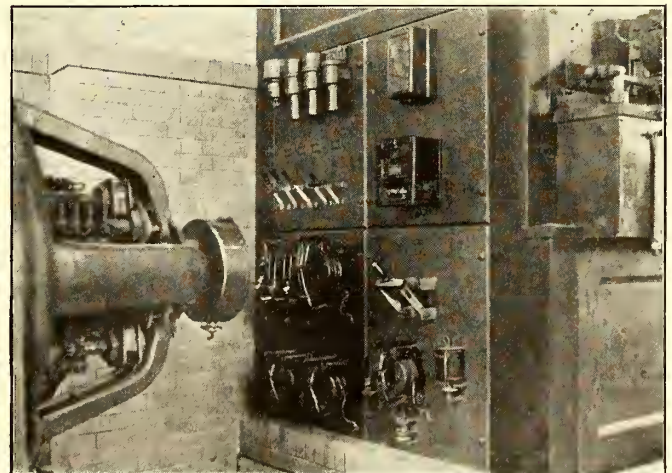
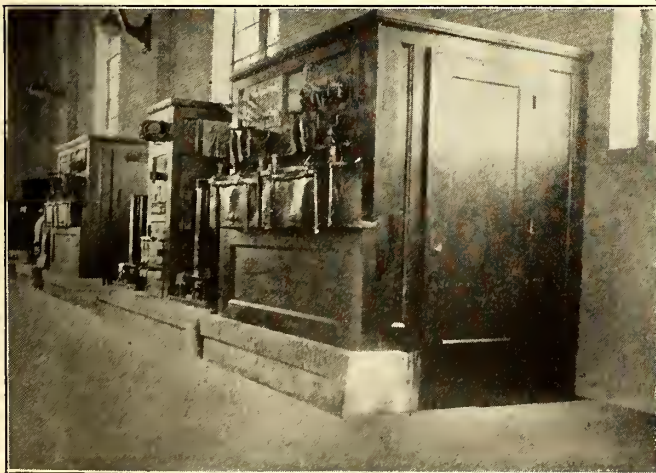
plant, for the most part, consists of apparatus of standard design for steel-mill work. This type of equipment was selected because of its sturdy and not over-sensitive characteristics. Hence, while the application of the automatic apparatus to the hydroelectric generating equipment is entirely new, the control equipment itself is of usual design but assembled to perform special duties. This equipment is installed on three generator

control cabinets and one exciter control cabinet located along one side of the power plant. There is also a terminal board cabinet which has been used as a terminus for all control and instrument wires. Beside each of the generator cabinets is the motor-driven rotary drum controller which determines the sequence of operation of the various relays and contactors in the same manner that this is accomplished in connection with the automatic railway substation. All instrument wires are brought to terminals in the instrument cabinet so that it is possible to cut in portable instruments for testing, in the absence of the permanent meters which are all installed in the steam plant. One feature of the control which differs from that which has been employed in the automatic substations is the over-speed protection device. In the automatic substation this is a simple mechanical device placed on the end of each rotary converter shaft, which closes a circuit through a relay when the speed of the machine reaches a certain point, the relay acting to cut the machine off the line. In the hydroelectric plant this protection is provided for the entire station by a 1-hp. induction motor which drives a speed-limiting device, closing a circuit through a relay in the same manner. As all generators are in synchronism, no one unit could race without carrying all others with it. This motor remains continuously on the line, since it consumes little

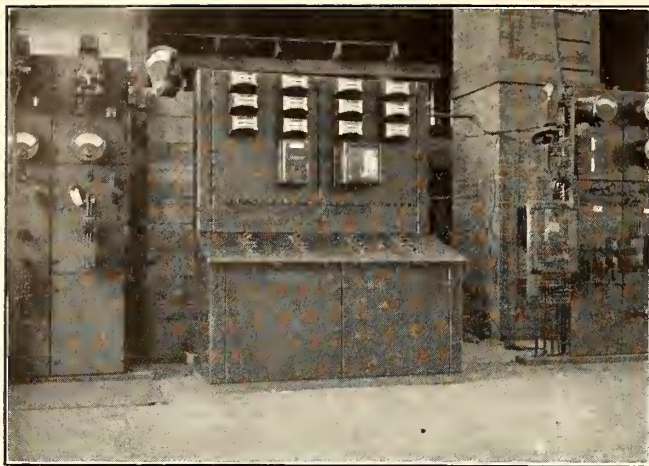


IOWA AUTOMATIC HYDROELECTRIC PLANT—CROSS-SECTION THROUGH TRANSFORMER AND SWITCH GALLERIES

The control equipment at the automatic hydroelectric plant, for the most part, consists of apparatus of standard design for steel-mill work. This type of equipment was selected because of its sturdy and not over-sensitive characteristics. Hence, while the application of the automatic apparatus to the hydroelectric generating equipment is entirely new, the control equipment itself is of usual design but assembled to perform special duties. This equipment is installed on three generator control cabinets and one exciter control cabinet located along one side of the power plant. There is also a terminal board cabinet which has been used as a terminus for all control and instrument wires. Beside each of the generator cabinets is the motor-driven rotary drum controller which determines the sequence of operation of the various relays and contactors in the same manner that this is accomplished in connection with the automatic railway substation. All instrument wires are brought to terminals in the instrument cabinet so that it is possible to cut in portable instruments for testing, in the absence of the permanent meters which are all installed in the steam plant. One feature of the control which differs from that which has been employed in the automatic substations is the over-speed protection device. In the automatic substation this is a simple mechanical device placed on the end of each rotary converter shaft, which closes a circuit through a relay when the speed of the machine reaches a certain point, the relay acting to cut the machine off the line. In the hydroelectric plant this protection is provided for the entire station by a 1-hp. induction motor which drives a speed-limiting device, closing a circuit through a relay in the same manner. As all generators are in synchronism, no one unit could race without carrying all others with it. This motor remains continuously on the line, since it consumes little



IOWA AUTOMATIC HYDROELECTRIC PLANT—FRONT AND SIDE VIEWS OF CONTROL CABINETS FOR TWO GENERATORS AND EXCITERS



IOWA AUTOMATIC HYDROELECTRIC PLANT—AUXILIARY REMOTE CONTROL SWITCHBOARD LOCATED IN NEAR-BY STEAM POWER PLANT

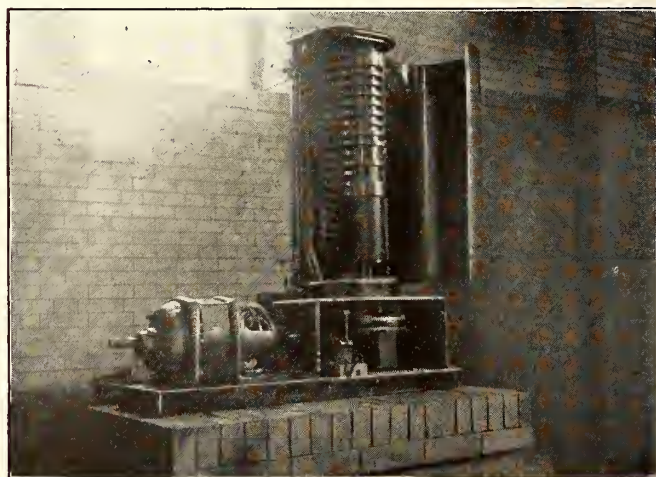
power, and it was hardly worth while, therefore, to provide relays to cut it off.

The sequence of operation of the control apparatus is in general as follows: When the operator at the steam station closes the small benchboard switch, previously mentioned, the drum controller at the hydroelectric plant starts to revolve. This same connection might have been accomplished by the action of the automatic float switches governed by the water level in the storage reservoir. The first circuit completed by the drum controller is through a relay which starts up one or the other of the exciter sets, depending on which way a triple-pole, double-throw switch is thrown. The 150-hp. motor of this exciter set is thrown directly across a 2300-volt line taking momentarily eight times full-load current and coming up to full speed and full voltage in three and a half seconds. Meantime the drum has continued to revolve and has closed the necessary circuit to energize the gate motor which opens the gate on the water wheel to about 0.2 full opening. After completing this contact the drum controller stops until the generator reaches a speed of 55 r.p.m., at which time a centrifugally operated switch on the top of the generator shaft makes a contact which starts the drum revolving again. This then completes the circuit which closes the main line contactor, putting the machine on the line without field

and in series with a set of reactors which will limit the current through the unit to about 2.5 times full-load current during the synchronizing period. Two of these reactors, which are of the single-phase oil-immersed type, designed for five-minute duty, are installed for each machine. A time interval between the closing of the centrifugally operated switch on the main generator and the closing of the main line contactor is provided in order to permit the generator speed to increase from 55 r.p.m. to 60 r.p.m., or synchronous speed, before the main-line contactor is closed. The next function performed by the drum is to close a circuit through the field coils. When the exciting current is first thrown on the generator field, it is limited by the field rheostat connected in the circuit to about one-quarter normal value. This gives the machine a chance to get in step, without unduly high current values. After a moment a section of the field rheostat is shunted out, increasing the field current to its normal value. The current-limiting reactors are then short-circuited and the contact-making ammeter closes a circuit through the gate motor which opens the gate to a point permitting the machine to carry full load. All of these operations require but thirty-seven seconds. The time which elapses from the instant the generator begins to take load until it is under full load is only seven seconds, because of the rapidity with which the gate-opening mechanism responds. In placing the generators on the line the action is similar to that of bringing a synchronous motor up to speed and placing it on full circuit. The ordinary synchronizing process as usually applied to generators does not become a part of the operation in this hydroelectric plant, since placing the machine on the line with low-field excitation allows the rotor to slip back or to be pulled ahead a fraction of a phase angle without trouble. Oscillograph records of the current in the main generator circuit show that the maximum disturbance during the starting period is not serious.

#### PROTECTION AGAINST POSSIBLE TROUBLE

The bearings of each machine are protected against overheat by thermostats of the spiral spring type which are set to operate at 45 deg. C. Should a bearing become overheated, the thermostat would promptly act to cut the machine affected off the line. When the bearing cooled down to normal temperature the thermo-



IOWA AUTOMATIC HYDROELECTRIC PLANT—EXCITER CABINET AND MOTOR-OPERATED DRUM CONTROLLER WITH SIDE CASING OPEN TO SHOW CONSTRUCTION



stat would automatically cut the machine in again. Thermostats are also placed on the current-limiting reactors and set to operate at 75 deg. C. Thermostats on the stator coils of the generators are set to operate at 65 deg. C. The speed-limiting device already described is set so that it shuts down the entire plant whenever the station frequency reaches 64 cycles per second. In a test of this device the main oil switch at the steam station was tripped from the benchboard, cutting all load off the hydroelectric plant, which, of course, would tend to make the machines run away. In one and two-fifths seconds after the oil switch was tripped, the frequency-limiting device operated and the water wheel gates began to close.

The possibility of a machine operating single-phase is prevented by the fact that part of the relays are installed in each phase, and the wiring is laid out so that the opening of any one of the relays will open all contacts and shut down the machine. All contactors are held in by energized solenoids, so that no-voltage failures are guarded against through the instant opening of all relays. The loss of excitation is guarded against by a relay in series with contacts which in opening shut down the plant. The generators are protected against surges by inverse time-element relays which cut the current-limiting reactors into circuit with the machine for an interval on not excessive over-

loads, before cutting the latter off the line. Under normal operation the 220-volt, 60-cycle energy supply for the control system is supplied from two 5-kva. transformers installed in the hydroelectric plant. In case of emergency, however, a throw-over switch supplies the control energy from the steam station power and lighting transformers.

The float switches guard against trouble from low water. No special provision has been made to guard against the accumulation of snow-ice, except the standard trash racks at the intake to the flume and at the intake to the wheel pits. In this connection it is interesting to note that a sudden stoppage of all units in the plant produces a piling of the water at the gate to such an extent that the back-wash effectively removes all trash from the rack and causes material which has gathered at the upstream trash rack to be washed over the spillways.

Since the hydroelectric plant was placed in operation a list of forty-eight conditions and combination of conditions which might occur to cause trouble at the plant were developed, and each one of these conditions was brought about artificially to test out the apparatus. In each case the plant or the machine, as the condition required, was automatically shut down until normal conditions were restored. These tests included everything from dead short-circuits to exciter failures.

## Depreciation and Rate-Making

New England Street Railway Club Discusses Important Phases of These Topics — Remarks by Public Service Commission Chairmen Show Appreciation of Electric Railway Problems

**F**RANK SILLIMAN, JR., vice-president Cumberland County Power & Light Company, Portland, Me., and of the banking house of E. W. Clark & Company, Philadelphia, addressed the New England Street Railway Club at Boston, Mass., on Nov. 22, upon "Depreciation." During the discussion a notable address was given by Frederick J. Macleod, chairman Massachusetts Public Service Commission, relative to depreciation and rate-making. William C. Bliss, chairman Rhode Island Public Utilities Commission, also spoke briefly but pointedly upon the needs of the electric railway to-day and the importance of making them absolutely clear to the general public. The remarks by Messrs. Silliman and Macleod are abstracted in other columns of this issue.

### DISCUSSION ON DEPRECIATION

The first part of the discussion was devoted mainly to questions put to Mr. Silliman. He said that he knew of no electric railway which has made adequate provision for depreciation, this being partly due to the relatively short time the subject has been a vital one in the thoughts and acts of transportation men. To determine what is the proper depreciation allowance in any case it is necessary to look over the history of the property. One cannot tell what the future service requirements will be on a railway, and obsolescence and inadequacy are almost beyond the power of anyone to forecast.

E. C. Foster, president Manchester Traction, Light & Power Company, Manchester, N. H., said that the great trouble in regard to depreciation has been that the electric railways have not had sufficient revenue to charge anything to depreciation and still pay out dividends. All electric railways were under a misapprehension for certainly twenty years, believing that the growth of earnings would care for depreciation. About ten years ago the setting aside of depreciation funds began, but to-day the 5-cent-fare unit is utterly inadequate to meet the requirements of caring for the property and meeting the increased cost of labor and materials. Not only should 6, 7 or 8-cent fares be imposed where required, but companies should be relieved of some of their public burdens. Mr. Silliman felt that if to-morrow every utility should begin to charge off depreciation its credit would not be much affected, but some companies which had been flagrantly paying unearned dividends would suffer in credit. A company, it was said, makes a better appearance before a regulating authority if it has been making provision, at least on its books, for depreciation.

Matthew C. Brush, president Boston (Mass.) Elevated Railway, emphasized the great importance of obsolescence, citing instances where companies are operating power plants and rolling stock which are worth 70 to 75 per cent of their original cost but are, none the less, obsolete under modern standards. He recalled a generating unit representing in 1911 the highest de-

velopment of the art, but now obsolete as a productive machine. Obsolescence and depreciation, he said, are properly a straight charge against fares. If all the companies in the country had charged off in the last twenty-five years what they should have, to meet obsolescence, there would not have been a lasting 5-cent fare in the land. Obsolescence occurs as a direct result of the pleasure and convenience of the traveling public and not as a matter of choice to the railway.

#### MR. BLISS ADVOCATED SLIDING SCALE OF RATES

Chairman Bliss of the Rhode Island commission said that the average member of the public has little real conception of electric railway financial problems, and goes into such matters blindly and often with prejudice. Claims that watered stock exists are presented in most exaggerated form, and the feeling of the average man is reflected in legislative bodies. In Mr. Bliss' opinion the 6-cent fare is not the remedy for the present situation in populous areas. It seems rather that a contraction of the single-fare area is preferable, thus retaining the short haul and more profitable riding, and charging more for the outlying rides. The increasing use of the automobile is endangering revenue seriously. Excessive 5-cent-fare areas must be contracted. What is desirable is a sort of sliding scale of rates providing automatically for increased fares without necessitating long hearings. Mr. Bliss said he disliked to refer to the Cleveland system, which has given more wrong impressions than anything else in the world, but in its provision for fare changes in accordance with the status of a special fund accumulated out of earnings the public follows along the line of paying for what it gets. [The speaker did not imply that the existing fares at Cleveland are adequate.—EDS.]

In moving a rising vote of thanks to the speakers, Mr. Brush said that the commissions should not be asked to do all the work of fare regulation. All railway men, including the manufacturers, must make it their business to have the public realize that the decisions of the commissions are fair. They must do their part in dissipating the feeling that the commissions represent merely the patrons.

## Accounting for Depreciation

### A "Correct and Workable" System for Handling Depreciation of Electric Railway Property— Depreciation Cannot Be Ignored

BY FRANK SILLIMAN, JR.

E. W. Clark & Company, Philadelphia, Pa.

**I**N my remarks I shall not enter into a discussion of the application of depreciation to fare or rate regulation, but shall address myself to the subject of depreciation itself and how to account for it. If depreciation is properly accounted for, its status as a factor entering into fare or rate regulation settles itself.

#### DEPRECIATION RESERVES SHOULD BE CHARGED TO OPERATING EXPENSES

I agree with the Interstate Commerce Commission that any reserves created to meet depreciation should be created by charges to operating expenses. My chief reason is this: A large part of depreciation is due to wear and decay of physical property. The useful life of that property depends in part upon current

expenditures for maintenance. Two utilities operating under similar service conditions may have very different lengths of useful life of the same kinds of property, because one spends more upon that property for current maintenance than the other does. Unless reserves for depreciation are created by changes to operating expenses there is grave danger that by assuming the same life of the property such utilities will move far apart as to the total amounts provided for current maintenance plus renewals.

The simplest and best accounting method is to have no reserves for depreciation, and charge the cost of both renewals and maintenance to operating expenses in the month or year in which the cost is paid. The only objection to this method is that it imposes upon the income of one fiscal period expenses belonging to previous periods. No prominent railroad system in the United States, except one (Norfolk & Western Railway), carries a reserve account for depreciation except as to rolling equipment. While very large public utilities may handle depreciation of all kinds of property in the same manner that railroads handle depreciation of way and structures, should this plan be generally followed by public utilities their operating expense accounts would be very much distorted whenever any important renewals were made, particularly in the cases of smaller utilities. It is solely because of this objectionable distortion that the creation of depreciation reserves by charges to operating-expense accounts or surplus is employed. It is, in effect, a provision for a depreciation equalization account extending over a period of years instead of one year, as other equalization accounts are now limited.

#### A CORRECT AND WORKABLE DEPRECIATION SYSTEM

Accounting for depreciation can be done by the ordinary public utility in a way which is correct in principle and workable in practice. Let us assume companies whose earning positions are as follows: Company "A" earns nothing on its stock and makes no provision for depreciation. Company "B" earns and pays 6 per cent on its stock and makes no provision for depreciation.

Unless Company "A" is growing in earnings density I have nothing to suggest other than to keep going as best it can, in the hope that something may happen to improve its earnings. Unless something does happen there is no remedy.

Company "B," if growing in earning density and desirous of maintaining the dividend rate, may devote all earnings above 6 per cent on its stock to the creation of a depreciation reserve until the accruing depreciation is adequately met. It would also be well to reduce the dividend rate unless there is a large surplus. Depreciation which has accrued previous to the date when adequate provision for it is made in expenses will have to be met by charges to surplus to cover the cost of renewals made on account of such depreciation; or, if surplus is not available, by charges to current operating expenses in sufficient amount to maintain a credit balance in the depreciation reserve. This is visiting the sins of the father upon the son, but it will not be the worst inheritance.

#### HOW ELECTRIC RAILWAY RESERVES SHOULD BE KEPT

Both of these companies should keep their books so as to show all of the appropriate depreciation accounts.

whether or not the amounts are adequate. For instance, in the case of an electric railway, reserves should be created for depreciation of (1) way and structures, (2) car equipment, shops and carhouses, and (3) power equipment.

If these reserves are to be created by charges to operating expenses, and net income is not large enough to stand the full amount required, there should be charged all that the net will bear, even if it is only a small amount per month for each account. It may be in some cases that it is not possible to tell in advance how much can be charged for depreciation without bringing the net income below the amount required for bond interest. In such a case the equalization accounts may be used as is illustrated below, in the case of depreciation of way and structures.

Suppose that the officers of a company believe that depreciation of way and structures requires a reserve of \$1,000 a month above current maintenance. Assume that at the beginning of the fiscal year the officers think it would be unsafe to charge this amount monthly and reduce it to \$500. This they know is inadequate, but they are hopeful that the results of operation for the full year will be such that \$1,000 a month will not bring net earnings lower than the amount wished for interest and dividends. This problem can be solved by charging operating expenses monthly with \$500 for depreciation and \$500 for equalization. If later it appears that the net income is going to be satisfactory, in the last month or months of the year, \$6,000 can be credited to depreciation reserve and the same amount charged to equalization reserve. On the other hand, if the results are not satisfactory from the point of view of net income, operating expenses can be credited in the last month, or during the last six months, with \$6,000 or any part of it, and the same amount charged to the equalization reserve. This shows how a growing company can take on the burden of depreciation.

#### MEASURING THE DEPRECIATION BURDEN

The next thing is to measure the burden which is to be taken on. I do not attach much importance to the relative merits of straight-line, sinking-fund, or other methods of calculating depreciation. Public utility properties should be maintained in an average condition equal to 75 per cent to 90 per cent of new. If maintained in a better condition, the cost of service is too high. If maintained in a worse condition, the service is poor.

Assume a property costing \$1, and maintained in an average condition equal to 80 per cent of new. That property should be represented by 80 per cent worth of property and 20 per cent in depreciation reserves. Unless it has an unappropriated surplus, the depreciation accrued in the past must be met out of the income of the future. One thing is certain, and this is that depreciation cannot be ignored.

No one can tell in advance the annual amounts required to meet accruing depreciation. Every experienced public utility manager of good judgment, however, can tell whether the appropriations of his company during the last five or ten years have been too much or too little. He can observe the development of his reserve balances and the condition of his property and increase or decrease the appropriations ac-

ordingly. The principal trouble about the whole thing is the lack of courage to try. There is no difficulty about it, and no mystery.

## Obsolescence Is Serious Problem

How Massachusetts Commission Views Depreciation  
—Higher Fare Question Requires Considerable  
Experimentation—Electric Railways  
in Critical Period

BY FREDERICK J. MACLEOD

Chairman Massachusetts Public Service Commission

THE matter of depreciation involves a number of different elements, one of which, the element of obsolescence, is perhaps the most difficult of all to determine upon any theoretical basis or to make provision for in advance, according to any scientific standard. In the electric railway field there never was a time—at least since the electrification of the roads—when obsolescence was so large a factor as in the last three or four years. The art of electric railway operation has undergone practically a revolutionary change in the last three or four years, particularly in regard to the matter of equipment.

I was talking recently with the owner of one of the largest and most successful public utility properties in this country. The property is not in Massachusetts. He told me that he had bought and placed in service within the last three years a large number of cars, and that if he felt he could get the necessary capital it would be good business for him to scrap those cars and replace them with the best standard of equipment, according to the needs of to-day. If that statement is correct, it shows what an extraordinary element of uncertainty is inherent in the management and the operation of electric railways.

Some concerted effort must be made, and that effort should be initiated by the various electric railways, to try to make an intelligent investigation of the service life of the different units in their properties; to try to determine upon the basis of past experience what, under normal conditions, may be expected to be the future life of the property which is now in service, and to try, as far as possible, to determine just what amount should properly be laid aside annually, in order to provide for replacing those units because they are worn out, or because their replacement by some other form of equipment would be justified purely from a financial and operating standpoint.

#### ADEQUATE DIVIDENDS MUST BE PROVIDED

Of course, that is only the basis for providing for depreciation, because the question of depreciation and the question of fares must go together. In the last analysis, it does not do much good to work these things out on a scientific basis and take care of them in your bookkeeping unless you can take care of them also out of your treasury. I think there is coming to be a fuller recognition of what constitute the real elements of cost in electric railway operation and a fuller recognition of the fact that the cost of the money that goes into the property is just as much a necessary element of cost as the wages of the men who are operating the plant.

There has been a disposition—for which there is a certain justification in legal theory—to claim that if the

company is confronted with a condition where, after it has paid its maintenance expenses, it must either sacrifice dividends or a provision for depreciation, there is an absolutely clear obligation on the part of the company to pass up dividends altogether and pay the entire operating surplus into a reserve fund for depreciation. Now, in so far as dividends represent profits beyond a fair rate of return on the investment, that principle is entirely sound. But in so far as it is necessary to attract money to the properties to keep them going, I can see no escape from the conclusion that dividends must also be provided in sufficient amount to enable the company to preserve its credit and to go forward in making the improvements and extensions that are absolutely demanded, not only in the interest of the integrity of the company and its stockholders, but in the interest of the public which it serves.

#### HOW THE MASSACHUSETTS COMMISSION HAS HANDLED DEPRECIATION IN RATE-MAKING CASES

The problem which confronted the Massachusetts commission, in the first instance, was to determine just what recognition should be given to accrued depreciation in determining the fair value of the property upon which a company is entitled, under the law, to a fair return. The commission was faced with that problem, shortly after its organization, in the Middlesex & Boston rate case. We found that throughout the country at large the theory which had received recognition far and away beyond any other theory, and which had almost become crystallized into a legal rule, was the rule that a return should be allowed only upon the value of the property less depreciation. The commission did not believe that this rule was sound or just to the men who had put their money into the properties. Furthermore, it did not believe that the application of any theory of this kind could be enforced without risking the practical bankruptcy of a large number of the electric railways in the State.

The consequence was that the commission adopted the theory that if the money was honestly invested in the properties, in the first instance, and they were maintained with anything like a decent degree of maintenance, the companies and the investors were not to be penalized, in the absence of mismanagement, for any depreciation of the property that had been brought about in the public service, unless it could be shown that the company had profited from that situation rather than the car-riding public. It was found on examination that few, almost none, of the companies in the State had been paying excessive dividends in the past. On the average, in the State, the returns were less than a fair investment return on the money put into the properties. If the companies had allowed their properties to depreciate in the public service and had not made any undue profit, the depreciation which ought under normal conditions to have been represented in a reserve, or similar account, had really gone to the car-riders in the form of fares which were lower than they would otherwise have been obliged to pay.

In dealing with the Middlesex & Boston rate case the commission also had to determine to what extent depreciation should be considered as an element of cost in electric railway operation, to be provided for out

of fares. From the very start the commission has consistently taken the view that proper depreciation charges, in order to keep the property up to a proper operating standard and to have a fund which will permit replacements to be made when due, are absolutely fair, just and legal charges against car-riders, and must be provided for in the rates which are fixed by the public regulating authorities.

#### PROPER FARE BASIS NOT YET DETERMINED

When it comes to the question of how companies are going to get additional gross revenue through fares I do not know of any one in this room (and if there is no one here, I believe there is no one outside) who can give a categorical statement as to the methods which are best adapted in the way of fare standards. I am of the opinion, from such experience as I have had in observing the results of different fare increases in Massachusetts, that none of us has yet hit upon the exact method of fare increase which is calculated to produce the maximum result in the way of corresponding increases in gross revenue. I believe there must be a considerable degree of experimentation with different methods of fixing fares before we can be sure that in the case of any particular property the right result is reached.

It is clear beyond any reasonable question that for certain companies, in certain kinds of territory, and upon certain lines, an increase of the unit of fare to 6, 7 or 8 cents is not going to cure the situation and give the companies the relief to which they are entitled, to which all are agreed they are entitled, and which might, from a superficial examination, appear to be predicated upon the increase in fares actually allowed.

The commission has recently allowed fares to be charged by certain companies upon a different basis, which, with a 2-cents-a-mile charge, recognizes distance as perhaps the controlling factor in the fixing of rates. This experiment has not been tried long enough for the commission to be able to reach any final view in regard to the efficacy of that method of fixing fares. My personal view, based on such observation as I have been able to make of the operation of this system, is that upon certain lines it will prove to be the most satisfactory method of fixing fares that has yet been adopted.

With city fares, the plan of charging on a strictly mileage basis is perhaps not practicable. I believe, however, that there are likely to be attempts made by Massachusetts companies to put into effect the system known as the Milwaukee fare system, with a central single-fare zone outside of which increments of fare are provided by successive and graded steps rather than by an immediate horizontal increase of 100 per cent. The inflexibility of the 5-cent zone system, where the moment the passenger reaches the limit of the first zone he is obliged to have his fare doubled, is responsible in large measure for the fact that in a large number of cases the single-fare zone in the cities has been extended beyond the limits to which a passenger can reasonably be carried for a single fare. As communities have been built up the companies have felt that they could not, at any rate without absolutely arresting the growth and development of the new sections, put their fares on a basis 100 per cent higher than their neighbors were paying. If there were some

system of intermediate steps it would be much easier to keep the fare limit within proper bounds.

INDUSTRY IS IN CRITICAL PERIOD

The situation is not one for panic, but it is distinctly one which is a menace to the whole fabric of community life at the present time. The time has come when the public is bound to recognize, and I believe is recognizing, the fundamental importance and necessity of co-operative action in bringing about the solution

of a problem that is of absolutely commanding interest to every citizen. We must have the electric railway employees and the managers pulling together. We must have the capitalists, whose support has done so much for the companies in the past, put their shoulders to the wheel. We must have the support of the local authorities. We must have the help of the Legislature, and we must have, and I can assure you that you are going to get, the support of the Public Service Commission.

# The Science of Preparing Car Axle Steel

Analysis of Causes of Failure and Discussion of Special Treatment Devised to Eliminate Weaknesses and Increase Desirable Properties—Stresses to Which Axles Are Subjected and Their Effect on the Steel

By W. L. ALLEN

President Valley Steel Company, St. Louis, Mo.

THE history of car-axle failures indicates that for most service a grade of steel known as normal steel may stand up indefinitely. At the same time, it frequently happens that cars are removed from service on account of a bent or broken axle. The causes of these failures and the means devised to overcome them have developed, through many years of experience, a most scientific treatment of steel for this use.

By normal steel is meant a product which, after forging or rolling is not subjected to any further process of refinement, such as heat treatment. The physical properties of such an axle are somewhat as follows:

Ultimate tensile strength.....	75,000 lb. per square inch
Yield point .....	35,000 lb. per square inch
Elongation in 2 in.....	18 per cent
Reduction of area.....	24 per cent

The yield point and ultimate tensile strength of an axle represent the strength of the material, or its resistance to breakage through the application of static load, while the elongation in 2 in. and the reduction of area indicate the toughness or ductility of the steel and represent the resistance to fatigue, alternating stresses or dynamic blow. In a comparison of the toughness of normal steel with that of heat-treated steel, it is better to consider the respective reduction of area of the two pieces rather than their elongation, because of the fact that a test piece of normal steel will elongate over its entire length of 2 in., while a test piece of a quenched and tempered steel will "neck down" and elongate over a length of only about 1/2 in. The difference in the action in the two cases is illustrated in Fig. 1.

Because of this difference in the manner in which the two steels draw out, the elongation of the quenched and tempered steel should really be taken in 1 in., or even better within 1/2 in., rather than within 2 in. as is the usual custom. However, as the original area of each test piece is the same, a comparison of their respective reduction of areas is truly representative of their toughness.

In the designing of axles for any given service, it is considered good practice to use a fiber stress of 8000 lb. per square inch. From the table above, it can be seen that the normal steel provides a good factor of safety against bending or breaking of the axle. The fact that a normal steel axle can be bent almost double before

breaking seems to indicate that it has sufficient toughness. It is nevertheless true that no matter how much care is used in the manufacture of axles or in their inspection, an occasional failure as the result of defective steel is unavoidable. A typical failure is shown in the sketch reproduced in Fig. 2.

In this case a crack had developed in the axle and had gradually extended through it until there was insufficient section remaining to carry the load; hence failure resulted. At the point of fracture a coarse structure will frequently be observed, and this

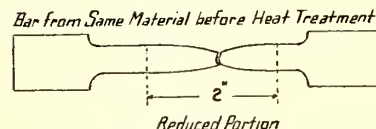
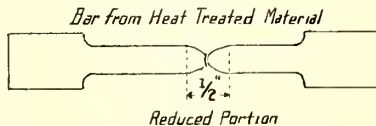


Fig. 1

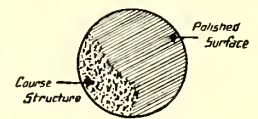


Fig. 2

HEAT TREATMENT FOR AXLES—FIG. 1—DIFFERENCES IN ELONGATION BETWEEN TEST PIECES OF TREATED STEEL AND NORMAL STEEL. FIG. 2—SECTION OF BROKEN AXLE SHOWING TYPICAL FAILURE

fact has given rise to the claim that the failure was due to crystallization. Such a claim is entirely unscientific and incorrect, as steel does not crystallize in its cold state when subjected to working stresses. The start of such a failure may be due in reality to either of two causes:

1. Inherent forging strains set up in the axle during the process of manufacture; or
2. Inability of normal steel to withstand the stresses to which axles are subjected in actual service.

In the forging of an axle, it is certainly true that strains are set up within the metal which may not be entirely eliminated in the subsequent cooling from the forging heat. The possibility of the development of such strains depends somewhat upon the process of manufacture and is greatly minimized by modern practice. However, the fact that some axles in which there are no defects and in which the pulling test indicates the physical properties to be satisfactory, fail soon after being placed in service, shows conclusively that these strains may be

sufficient to approach so closely the yield point and the tensile strength of the steel that the increase in stress added when the axle is placed in service will exceed the strength of the steel and cause a failure to start. If these combined stresses are sufficient to exceed the tensile strength of the entire axle, breakage will result immediately; but if on the other hand these combined stresses are merely sufficient to exceed the strength of the outer fiber, a small hairline crack may develop on the surface of the axle and gradually extend until failure results. Annealing of axles after forging has greatly minimized such breakage, but even the annealed axle will not stand up satisfactorily under certain conditions of service. Such a service is one in which heavy cars are operated at high speed or where, in order to lighten the weight of the cars, the section of the axle has been greatly reduced.

It is therefore felt that there are stresses to which axles are subjected in service other than those brought about by the normal static loads, and in fact even superficial investigation proves conclusively that such is the case. For example, when a car is operated over crossings, the axle is required to withstand a very severe dynamic shock, which tends momentarily to increase the amount of deflection in the axle and set up an alternating impact stress. Furthermore, it sometimes happens that car wheels will momentarily roll on the flanges, and then when these wheels again bear on the tread, a very severe bending action is set up, causing not only an alternating impact stress but a deflection in the axle sufficient frequently to cause it to bend. There can be no question, therefore, but that in normal operation an axle is required to withstand a combination of static load with a very severe alternating impact. This is the very hardest service to which steel can be subjected. Steel under the stress of alternating impact must ultimately fail even though these stresses do not exceed the elastic limit of that steel. Furthermore, the life of steel under such stresses is dependent upon how nearly the elastic limit is approached.

The life of an axle in any given service is therefore largely dependent upon the elastic limit or yield point, and while some failures undoubtedly result from other causes most failures may be traced to the fact that the combined static and alternating impact stresses approach too nearly the yield point or elastic limit of the steel. Such failures can be minimized or entirely eliminated through the use of a steel having a higher elastic limit. Such an axle can be produced through heat treating. By this is meant the alternate heating and cooling of an axle after forging in such a manner as to refine the grain structure and improve the physical characteristics of the steel.

#### THEORY OF HEAT TREATMENT

If a piece of steel is heated to a high temperature and allowed to cool slowly from that temperature and its rate of cooling is carefully noted, it is found that the cooling proceeds for a time at a uniformly retarded rate, and then, when a certain temperature is reached, a most interesting and significant phenomenon takes place. The cooling is momentarily arrested and for a time no drop in temperature results. In fact, the metal actually gives out heat or recalesces. Hence, the temperature at which this occurs is termed the "recalescence point." After a certain lapse of time, the metal resumes the normal rate

of cooling. This phenomenon is shown in the accompanying curve (Fig. 3).

Since during this action the surrounding atmosphere does not cease to abstract heat from the metal, it is evident that there is a spontaneous generation of heat within the metal itself sufficient to exceed the heat lost in radiation. This is caused by a molecular rearrangement in the metal. In heating, the reverse condition takes place. The steel absorbs heat at a uniform rate until a temperature is reached at which the rise is momentarily retarded or stopped. This is known as the calescense point. On account of a certain hysteresis, frequently noted in such phenomena, the calescense and recalescence points for any given steel do not coincide, the former point being higher than the latter.

It has been found that the amount of carbon manganese, silicon, phosphorous and sulphur in combination with iron, as well as the amount of nickel, vanadium, chromium, etc., which are sometimes added, have an effect on the calescense and recalescence points, or critical points, as they are sometimes termed. As these elements, particularly carbon and manganese, are increased, the critical points are lowered. For example, a steel having 1 per cent carbon has a lower critical temperature than a steel with 0.2 per cent carbon.

When molten steel is cooled to atmospheric temperatures, the carbon chemically combines with a molecular proportion of iron to form an iron carbide. When this steel is reheated to a temperature above its calescense point, the carbon is thrown into solid solution and in cooling becomes harder or softer according to the carbides formed. These carbides are controlled by the rate of cooling and the carbon content of the steel. This heating and cooling of steel, by which the physical properties may be changed, consists of three distinct operations—annealing, hardening or quenching, and drawing or tempering—and collectively they are termed the "heat treatment of steel."

Annealing of steel may be done either for the purpose of increasing its softness for machining purposes or to relieve any strain set up in the metal during forging. The process consists of heating and slow cooling and is generally done by heating the steel to some temperature immediately above its calescense point and cooling either by allowing the piece to remain in the furnace and reduce its temperature gradually or by removing it from the furnace and cooling in the air.

In hardening steel, it is first necessary to heat it above the calescense point in order to break up the existing condition of the carbides. The temperature should not be carried much above the calescense point, as any heating above this does not materially affect the resultant hardness but does tend to make the grain of the metal more coarse. When the steel has attained uniformly the desired temperature, it is removed from the furnace and cooled rapidly by quenching in some solution, such as oil, water, brine, etc. The higher the carbon content and the more rapidly the steel is cooled, the greater is the increase in hardness, while the grain structure is more highly refined as the rate of cooling is increased. The rate of cooling is sometimes considered a function of the heat conductivity of the cooling medium.

Repeated experiments have determined that the quenching of steel in some solutions is not as effective as in others; for example, oil is less effective than water

or brine. The effect on the hardness and structure of a given steel resulting from quenching in various solutions may be observed from the micro-photographs, Fig. 4 and Fig. 5 reproduced herewith. The test pieces used in making these photographs were of the same analysis throughout, the only variable being the solution in which each was quenched. A Brinell test was made on each piece, a section of each polished and a micro-photograph taken showing the structure magnified 400 diameters.

While the water-hardened specimen is harder than the oil-hardened, the most noticeable difference is in the refinement of the structure of the two specimens. With the hardening process properly carried out, it is frequently true that while the structure is highly refined and the material made very hard, its hardness is greater than necessary, and the metal is too brittle or is weakened by shrinkage strains set up in quenching. In order to relieve brittleness or shrinkage strains or reduce the hardness, the piece is drawn back or tempered.

Tempering consists of reheating a hardened piece of steel to a temperature below its critical points and then allowing it to cool slowly in air. In this process the unstable condition of the carbides brought about in the

which is free from internal strains and possesses an elastic limit somewhat higher than a normal axle. Such a grade of axle will therefore undoubtedly give much better service and greater life than will a normal steel axle. However, if the assumption that the life of an axle is largely dependent upon its elastic limit is correct, any process which will materially increase its elastic limit and which does not develop other inherent bad qualities, will unquestionably increase the life of such an axle. Such an improvement can be brought about through the medium of quenching and tempering the axles. The process of heat treatment can be so conducted as to increase very materially the elastic limit of the steel without decreasing the toughness, or better still, it can be so conducted as to increase both the strength and the toughness. A comparison of the physical properties of a normal steel axle with a quenched and tempered steel axle will show the extent of this improvement.

In addition to an increase in the strength and toughness, proper annealing will develop a closer and denser

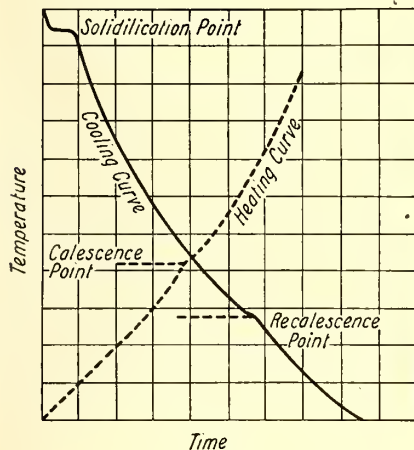


Fig. 3



Fig. 4

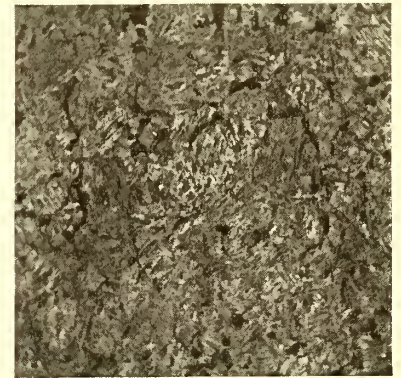


Fig. 5

HEAT TREATMENT FOR AXLES—FIG. 3—HEATING AND COOLING CURVES OF STEEL. FIG. 4—MICRO-PHOTOGRAPH OF OIL-QUENCHED STEEL, BRINELL HARDNESS 364. FIG. 5—MICRO-PHOTOGRAPH OF WATER-QUENCHED STEEL, BRINELL HARDNESS 555

hardening operation, can be somewhat changed. The extent of this rearrangement is controlled by the temperature to which the piece is reheated and the length of time it is held at this temperature. The result is to decrease the hardness of the metal and increase its toughness. The arrangement of the carbides thus produced is stable at atmospheric temperatures, or in fact at any temperature below the draw back or tempering point. Heat treatment is complete with this operation.

HEAT TREATMENT OF CAR AXLES

While the fundamental reason for annealing is to relieve axles from any forging strains which may have been set up, this operation can be so conducted as somewhat to increase the elastic limit over that of normal steel. For example, a comparison of the physical properties of a normal axle with an annealed axle will show a slight increase in the elastic limit of the latter, as seen in the table opposite.

If the process of annealing is intelligently conducted with adequate equipment for a uniform heating and cooling of each piece, a grade of axle is produced

	Normal Steel Axle	Quenched and Tempered Steel Axle
Ultimate tensile strength per square inch	75,000 lb.	97,500 lb.
Yield point or elastic limit per square inch	35,000 lb.	60,500 lb.
Elongation in 2 in.	18 per cent	23 per cent
Reduction of area	24 per cent	46.7 per cent

grain, and quenching and tempering will increase the extent of this refinement. A tempered axle, therefore, has not only the advantages of the higher elastic limit with greater toughness but the additional advantage of a much higher refinement of grain structure. This property means an increase in the resistance of the steel to shock or alternating impact and also a decided increase in its wearing qualities when subjected to erosion, as is the case with axle journals. A properly quenched and tempered axle therefore not only minimizes the possibility of bending or breaking but also increases the life of the journals.

IMPORTANCE OF UNIFORMITY IN TREATMENT

It is extremely important that any process of either annealing or quenching and tempering be conducted

	Normal Steel Axle	Annealed Steel Axle
Ultimate tensile strength per square inch	75,000 lb.	88,600 lb.
Yield point, or elastic limit per square inch	35,000 lb.	53,000 lb.
Elongation in 2 in.	18 per cent	26.5 per cent
Reduction of area	24 per cent	43.9 per cent

under the most uniform conditions and with the application of the greatest intelligence in order that the desired improvements may be brought about. As some electric railways have had unfortunate experiences with heat-treated axles, it may be well to point out just what procedure is necessary in a successful treatment.

In the first place, it can readily be appreciated that if the axles under heat for either annealing or quenching and tempering are subjected to a rash heat in which the outside of the axle becomes much hotter than the center, that additional internal strains will be developed which may be more detrimental than any strains set up through forging. In fact, it is known to be true that these strains may be sufficient actually to crack the axle when it becomes cold. If any such strains are set up in the heating of an axle, quenching will accentuate them. Such a condition has been noted by some railways when a new axle has broken in the lathe while being finished or has shattered when dropped on the floor.

If a uniform product is to be obtained, the heating must be maintained absolutely uniform. Cases have been observed where the heating has varied so much that only part of the axle was heated above the critical temperature while the rest of the axle did not reach this temperature. This resulted in a product in which there was virtually a line of demarkation between the refined and the unrefined steel. Such an axle is almost sure to fail. Because of the importance of the uniformity of heating, the character of the furnace in which the heating is done is of first consideration. It must be so constructed that the axles will be heated to a uniform temperature throughout their entire length and thickness, and the method of heating must be such as will not rashly force the operation. There are several types of furnaces used in this kind of work, and in the order of their metallurgical efficiency they are the coal fired, producer gas fired, natural gas fired, oil fired, muffle furnaces fired by any of these fuels, and electric furnaces. The last is so much superior for this work that it stands out far above all other types of furnaces insofar as uniformity and control of the heat are concerned.

The heating must not only be done uniformly and with a mellow heat, but the steel must be raised to exactly a certain temperature in order to accomplish the desired results. For example, in annealing, it is sometimes possible very materially to decrease the strength or somewhat increase the strength through the use of slightly varying temperatures. This control of the heat to exactly the proper temperature is even more important in the process of quenching and tempering than in annealing, the best results being obtained by heating slightly above the upper critical point. Any increase in temperature above this point will not increase the strength or toughness but will coarsen the grain structure.

After axles have been uniformly heated by soaking at the proper temperature, it is extremely important that the method of cooling be scientifically carried out: If they are removed from the furnace and allowed to cool in the air, they will have greater strength and less toughness than if allowed to cool more slowly in a soaking pit or in the furnace. It is very necessary, however, that care be exercised when the axles are cooled

in the air to keep them free from air current, for this might set up sufficient strains actually to bend the axle. It is also extremely important that the entire heat cycle be completed without any lapse of time between steps in the process. For instance, after the axles are quenched they must be removed from the quenching bath before becoming cold and immediately put back in the furnace for tempering. The reason for this is that in quenching axles, particularly large sizes, certain quenching strains are set up, due to the fact that the outer surface of the axle will cool more quickly than the center. If the axles are permitted to cool down to atmosphere temperatures and these strains are permitted to develop, they may be sufficient to set up minute hairline cracks in the surface. On the other hand, if the axles are removed from the quenching bath at just the proper temperature and immediately put back in the furnace, these strains are not permitted to develop to such an extent as to cause cracks in the surface and are subsequently entirely eliminated through the drawing or tempering.

It will readily be appreciated from the above statements that if satisfactory results are to be obtained in the heat treatment of axles, this work must be carried out under the most ideal conditions and under the most intelligent supervision. For this reason it has become general to look upon the electric heating furnace as the type of furnace best adapted to commercial heat treatment. The product of this type of furnace is as much superior to that of the ordinary furnace as the product of an electric melting furnace is to Bessemer or open hearth steel. By means of the electric furnace, the rate of heating and the exact temperature required may be absolutely controlled. It is also possible to bring about the proper heating without bringing any flame in contact with the steel so that the steel simply absorbs the heat radiated from the furnace and thus makes it possible to conduct a heat for annealing, quenching or tempering without setting up detrimental heating strains. Tests made in furnaces of this type show that there is no variation in the temperature from end to end or at various heights within the heating zone.

As the result of the use of an electric furnace and an arrangement of quenching tanks and cooling pit which makes possible very efficient handling of axles through the complete heat cycle, the Valley Steel Company has been able to produce a steel for car axles known by the trade name of "Electroheat" axles which compare favorably with the standard specifications of the American Society for Testing Materials and the American Electric Railway Association.

	A. S. T. M.	A. E. R. A.	Electroheat
Ultimate strength per square inch	85,000 lb.	85,000 lb.	95,000 lb.
Elastic limit per square inch . . .	50,000 lb.	50,000 lb.	60,000 lb.
Elongation in 2 in.	20.5 per cent	22 per cent	20 per cent
Reduction of area	39 per cent	45 per cent	40 per cent

In conclusion, it is well to point out that the heat treatment of axles should not be applied except in the most scientific manner and that this is only possible in a plant laid out in such a manner as absolutely to insure the results. Axles produced under such conditions will reduce to the minimum the possibility of inherent defects and result in a material which will minimize or entirely eliminate axle failures.



# Illinois Association Lays Plans for War Board Co-operation

Also Has Meeting with Shippers and Secretaries of Association of Commerce to Learn What the Principal Transportation Needs Are and to Inform Them of the Tentative Plans of the Electric Railways

A MEETING of the Illinois Electric Railway Association was held at the Sherman Hotel, Chicago, on Nov. 21, for the purpose of devising ways and means of co-operating with the Electric Railway War Board at Washington, and to lay plans for a wide expansion of the freight business now carried by the electric railways of the State. Britton I. Budd, member of the War Board and chairman of the sub-committee on traffic, addressed the meeting, giving the plans of the War Board as far as they had been formulated and enlisting the active co-operation of the association in the important transportation work they must undertake in order to relieve the steam railroad congestion. Acting in this direction the association passed the following resolution:

"Resolved, that the railway members of the Illinois Electric Railway Association, in meeting assembled, hereby offer to the United States government the services and facilities of their lines individually and collectively for the transportation of passengers and freight wherever and whenever they can be made available for the benefit of the government."

A resolution was also passed by the members of the association to the effect that the War Board at Washington be informed that it was the sense of the meeting that the member companies of the association would place their properties entirely under the jurisdiction of the War Board and give it full power to dictate the policies and practically operate all these properties as a single system. Copies of this resolution are being sent to all member companies for their individual approval.

In order to determine the physical obstacles to interchange of freight traffic among different electric railway lines, and to make a general survey of the field for bringing out the full possibilities of handling freight shipments over the electric lines, the association voted that a committee should be appointed to make these studies, and President C. F. Handshy appointed the following members: F. E. Fisher, general superintendent Chicago, Ottawa & Peoria Railway, chairman; F. W. Shappert, traffic and industrial agent Chicago, North Shore & Milwaukee Railroad; R. Breckinridge, general freight and passenger agent Aurora, Elgin & Chicago Railroad; H. G. Faithorn, traffic manager the Chicago, Lake Shore & South Bend Railway, and J. R. Blackhall, general manager Chicago & Joliet Electric Railway. This committee began at once the work of compiling such data and information as are necessary to derive the traffic interchange possibilities.

## A MEETING WITH THE SHIPPERS

On Nov. 22 a second meeting of the Illinois Electric Railway Association was held at which some thirty rep-

resentatives of prominent local shippers and secretaries of associations of commerce from the cities surrounding Chicago were present by invitation. In general, these men expressed interest in the possibility of the electric lines being able to handle more or less of their freight shipments in the local territory and assured the association members that if they could provide the facilities the shippers would furnish all the shipments they could handle. A representative of the Carson, Pirie, Scott & Company wholesale house stated that they shipped an immense quantity of l. c. l. merchandise to local points around Chicago and that the delivery over the steam roads is exceedingly slow. He said that if shipments could be made from Chicago to Louisville by way of electric lines entirely, his firm could give the lines all they could handle.

The president of the Joliet (Ill.) Chamber of Commerce referred to the very satisfactory service he had received in shipping merchandise from Joliet to Michigan points by way of the lake boats and interurban lines in Michigan. He spoke in particular about shipments of large quantities of calendars which must be delivered on time, especially monthly calendars, and how the electric lines had handled this business with great dispatch, whereas the steam roads had injected considerable trouble into the business transactions for him through the long delays. Because of this service, he expressed interest in any plan which would make it possible for him to use the electric lines to greater extent.

Some of the electric railway men and the shippers were surprised to learn that the Illinois Traction System had joint arrangements with the Chicago & Eastern Illinois and the Rock Island railroads, whereby it was possible for shippers in Chicago to reach more than 100 towns on the Illinois Traction System and to make l. c. l. and carload shipments in M. C. B. equipment all the way. This information was given by C. E. Bode, general freight agent I. T. S., who also stated that joint arrangements were in effect with the Chicago & Alton, the Michigan Central and the Wabash Railroads, for service to points on the Illinois Traction System.

The shippers generally lamented that it was necessary at the present time to haul shipments for the electric lines out of Chicago by team or truck from the business district from 8 to 12 miles out to reach the electric railway terminals. The Chicago traffic manager of Butler Brothers stated that but for this condition his firm would be glad to make extensive use of the electric lines, but that it was impossible to send a truck or a team so great a distance. He said that it cost more than \$20 a day to operate a 5-ton truck and more than \$14 a day for a 3-ton truck.

G. T. Seeley, assistant general manager Chicago

Elevated Railways, explained briefly the franchise limitations which at the present time prevent the hauling of freight over the surface or elevated lines in Chicago. He said that this was principally an outgrowth of an antagonism of long standing against the handling of freight through the streets, but that he could see no difference whether it was handled in electric cars or in enormous motor trucks, which have a particularly deteriorating effect on the pavement. He thought that if the shippers would start an agitation to gain the privilege of the use of the streets between the hours of 1 and 5 a. m. for the electric lines to haul freight, an immense benefit could be derived for all concerned. He said it was difficult for the electric railways to accomplish this themselves on account of the political situation, but the time seemed particularly propitious for bringing about such an arrangement.

H. C. Barlow, chairman of the traffic committee Chicago Association of Commerce, addressed the meeting briefly and stated that as the steam roads are fast arriving at the point at which they will be unable to handle the transportation of the country, the present seems to be a most auspicious time for the electric railways to make themselves felt in the commerce of the country. He thought the question for that meeting to consider was: "How can the commerce of the country best utilize the electric lines, not only in and of themselves, but in connection with steam lines?" He said that Chicago shippers had become accustomed to using the electric lines in Michigan to quite an extent in conjunction with the lake boats, but that the government was now taking the boats so that this traffic was waning.

Mr. Barlow thought the time to ask for steam railway connections was right now. The electric railways should get a man in the field who is familiar with all the joint facilities and who could serve as an information bureau as to the service the electric lines were capable of giving. He wondered if it would not be possible to bring about some connection between the interurban lines coming into the outskirts of Chicago and the Chicago Tunnel Company, which serves directly forty of the largest shippers and, indirectly, all shippers through five universal transfer terminals. He said that if this could be accomplished so that the long haul now necessary to reach the electric lines were eliminated, the Chicago shippers would welcome the electric lines with open arms. In answer to a question from a member of the association, he said that the traffic committee of the Association of Commerce would be very glad to meet a committee of the electric lines after Dec. 1, to formulate plans whereby the obstacles which at the present time prevent the electric lines from serving the shippers of Chicago might be removed.

Numerous instances of the slowness of the freight service from Chicago into the surrounding territory, which could be greatly improved if the electric lines were made available, were cited. It was pointed out that while La Porte, Ind., is only 59 miles from Chicago, it takes three and four days to get a shipment. A peddler car service from Chicago to Cadillac, Mich., requires six days, while the same service can be given over the Chicago, North Shore & Milwaukee Railroad and the lake boats in less than two days. Shipments of meat from the stock yards in Chicago to the cantonment

at Rockford, Ill., are of such slow movement that it requires five days for a car to make one round trip. The same service could be given by electric lines over the elevated structures, the Aurora, Elgin & Chicago, the Elgin & Belvidere, and the Rockford & Interurban railways, leaving the stock yards at 1 or 2 a. m. and arriving at the cantonment early the next morning, and thus avoiding the necessity for icing. By this means also one round trip a day could be had out of each car. Such service as this, for instance, would release five car-days to the steam roads for long-haul service for every carload hauled by the electric lines. Thus the use of the electric lines will operate to greatly relieve the steam-road congestion, when the summation of all such possibilities is considered.

Speaking of how additional equipment could be secured promptly, the electric railway men expressed the idea that summer passenger cars could be used by taking the seats out and putting a temporary lining inside. Also practically every road has more or less construction equipment which is not in use during the winter time and on account of shortage of materials will likely not be in use next summer, and that these could be used for hauling certain classes of freight.

#### COMMERCE ASSOCIATIONS INTERESTED

In a great many of the replies to the letters which F. W. Shappert sent to the associations of commerce in a large number of cities in Wisconsin, Illinois, Indiana, Michigan and Ohio, inviting them to have a representative at this conference, there is a marked interest in the contemplated plans of the electric railways to engage in the handling of freight as far as possible. Many of the letters carry a tone of eagerness for such facilities to be made available, thus indicating the great difficulty they are now experiencing with slow deliveries and inability to get cars on the steam roads. Almost without exception the secretaries asked to be informed of the outcome of the meeting, if it proved to be impossible for them to have a representative present.

#### Women in Railway Work

A paper on this subject was read at a meeting of the New York Railroad Club on Nov. 16 by Stuart Brady, special agent Philadelphia, Baltimore & Washington Railroad. The paper contained a table showing that the number of female employees of the Pennsylvania Railroad lines, east of Pittsburgh and Erie, has increased from 1494 on May 1 to 3730 on Sept. 1, and the statement is made that the figure for Oct. 1 will be approximately 35 per cent in excess of the Sept. 1 figures. On the Maryland division, only women over twenty-five years of age are taken. The paper is illustrated by views showing women in such capacities on the Pennsylvania lines as crossing guards, signal tower operators, storeroom attendants, baggage checkers, machinists and telegraphers.

Employees of the several public-utility properties controlled by the Illinois Traction System, Peoria, Ill., subscribed for a total of \$82,000 of the government's Second Liberty Loan Bonds. This subscription was made possible by an easy-payment plan offered by the company.

# American Association News

**C. Loomis Allen Appointed Resident Director at Washington of Electric Railway War Board—He Issues Statement Outlining Possibilities of Board's Work—Headquarters Are at 908 Munsey Building—Board Met Nov. 23 and Will Meet Again Dec. 7**

## War Board Meets Again

**B. I. Budd Reported Successful Conference Regarding Income of Freight Traffic—Entire Board Will Attend Forthcoming Transportation Conference in Washington**

The Electric Railway War Board held another meeting in Washington on Friday of last week. All of the members were in attendance as were also President Stanley, C. Loomis Allen, Secretary Burritt and H. C. Clark. The principal business accomplished was the appointment of a resident director in Washington and the selection of headquarters in that city. The office selected is No. 908 Munsey Building, and C. Loomis Allen, president of the firm of Allen & Peck, was chosen resident director. An interview with Mr. Allen appears in an adjoining column.

In reporting for the sub-committee on the promotion of freight traffic, Britton I. Budd said that several conferences on the subject of increasing the amount of electric railway freight traffic had been held in Illinois, in one of which representatives of chambers of commerce had participated, and that further conferences would be held.

The board decided that it would be desirable to appoint committees in the different states to compile information in regard to routes, rates, etc., useful for traffic men to have. The board also decided to appoint a traffic representative with headquarters at Washington.

Chairman McCarter explained that the fuel administration had asked the board to designate a representative to be sworn into government service and have a desk in the office of the fuel administrator, to take charge of electric railway coal matters, just as the electric lighting and gas interests have such a representative. The board decided to appoint a representative. This decision makes it very necessary for the association to have full returns on the electric railway coal situation in answer to the blanks issued to member companies last August. These blanks call for statistics as to the amount of coal consumed, sources from which it is obtained and other data. Some of these blanks have not yet been returned to the association, and an urgent plea is made that this information be filed at the New York headquarters at as early a date as possible.

The subject of the forthcoming conference of all the transportation interests to be held during the next week or two on the call of Daniel Willard, chairman Advisory Commission, Council of National Defense, was mentioned, and it was decided that the entire Electric Railway War Board would attend this conference.

Secretary Burritt reported that the subscriptions for the support of the board were coming in well.

The board decided to ask all electric railway companies to furnish the board with formal authority to take certain action for them in connection with trans-

portation matters. This authority is somewhat like that vested in the Railroad War Board of the steam railroads but not so extensive. The agreement which the electric railways will be asked to sign reads as follows:

"The undersigned electric railways, acting through their proper officers, and actuated by an appreciation of the great opportunity offered the industry to be of service to the country in the present crisis, hereby pledge themselves with the government of the United States, with the governments of the several states, and with one another, that during the present war they will place at the disposal of said War Board the facilities of their respective companies, and co-operate in every practicable way in the attainment of the objects of said board."

The next meeting of the board will be held on Dec. 7 at Washington.

## Statement by Director Allen

**Fullest Co-operation Among All Means of Transportation Important—Economies Possible Through Assistance of Public**

After his appointment C. Loomis Allen gave out a statement on the purposes of the board in which he said:

"The Council of National Defense has wisely decided to call into conference representatives of all forms of transportation for the purpose of co-ordinating their facilities. The success of our armies and the continuance of our industries depends upon the nation's ability to provide transportation. The problems involved may be solved if team work between the various interests can be brought about. Besides our steam railroads, electric roads, waterways and motor trucks can all be used for the transportation of materials and men.

"There are 41,000 miles of electric railway in the country. Of this a little more than 16,000 miles is interurban. Between five and six billion dollars are invested in electric railway properties. It is in order that the greatest possible use can be made of the resources of this system of transportation, both by the government and by industry that the association has organized a War Board. It is not a case of the electric railways competing for business with the steam lines, with waterways or motor trucks—it is rather a case of supplementing the service which these others perform. If the work is to be done successfully, it will mean not only the fullest co-operation between the various transportation interests but the equal co-operation on the part of the public.

"For instance, electric railways in some cases parallel and in many cases serve the same territory as steam roads. It is entirely possible so to arrange schedules as to allow electric lines to take over much of the local work of the steam roads and so release equipment for through service.

"It is possible also, in many cases, to arrange for interchange of traffic between electric lines which are now in the main operated independently of each other, thus avoiding congestion in steam road terminals and enabling quick shipments.

"The steam roads have furnished to the priority boards and to the fuel administration a list of some 450 commodities which they declare to be non-essential, and upon which it is proposed to place an embargo. It is entirely possible that arrangement can be made to transport some of these commodities by electric railways.

#### EMERGENCY SHIPMENTS POSSIBLE

"Emergency shipments may also be handled by the electric lines. The other day two carloads of goods, by arrangements made by telephone over night, were shipped from Boston to New York by electric lines. The coal supply of one of the large cantonments in the Middle West is now being assured by an arrangement with an electric line by which the congestion of an important steam-road terminal is avoided.

"An important function which electric lines, both urban and interurban, can perform in conjunction with the Food Administration is in the collection and distribution of food products, first in the country—from the farmer; and second, in the city—between the wholesaler and the retailer. Extensive experiments are now being carried on with a container system, which, if successful, will enable goods in quantities as high as 5 tons to be carried directly from the producer to the store where it is sold to the consumer.

"This all means that new uses are being found for the electric roads, and that more new uses will be found. There are, of course, some engineering problems to be overcome, and difficulties may be encountered in the restrictions which some communities have placed upon electric railway operation. That is why the assistance of the public is necessary. These are war times, and transportation agencies must not be hampered in the rendering of service. I am firmly convinced that the public will throw no obstacles in the way of putting our roads in such shape that they can render the fullest service to the government.

#### COAL ECONOMIES SUGGESTED

"Electric railways are among the largest users of coal and the largest employers of labor. Coal and labor are, with food, the things which above all else must be conserved in the interest of the nation. We are willing and anxious to do our part, and the effort of every electric railway manager of the country is being exerted to effect economy. In this effort we can, I believe, look for the co-operation of the regulatory commissions, both state and local, and of the public itself. Unnecessary service causes waste of fuel and waste of labor. It means that just so much less of each will be available for other essential war-winning purposes.

"The Public Service Commission of Oregon, realizing this fact, has ordered an extensive cutting down of service in the city of Portland. Other commissions are acting on similar lines. I believe that we must all come, as they have already come in a number of places, to 'staggered' hours for factories and business houses. It is the 'peak load' that wastes coal and wastes labor. In every city in the country, at a certain hour each day,

thousands of workmen and workwomen are dismissed, and the service required of the companies is increased in an instant 150 or even 200 per cent. If the load thus forced on electric railways during the hour of closing could be distributed over a longer period of time, the saving in coal consumption and in labor would be large. 'Staggered' closing hours have been tried in the Ford plant at Detroit, where 40,000 employees were formerly turned loose at the same time and the street car service disrupted. Now they are dismissed at different hours, and the service is not only immensely improved but a large saving has been effected. In Seattle's new industrial district a similar arrangement of hours has been put into effect with equally good results, because the credit of our companies will not permit capital expenditure, which would use money needed for war purposes.

"The board has placed its services entirely at the disposal of the government. The Council of National Defense will name a representative on the board in order to bring the two bodies into direct touch. The board proposes to co-operate in every way in the solution of what is to-day the greatest problem facing industrial America—that of transportation—and it believes that it can count upon the aid and assistance of the public, without which little can be done."

#### Patriotism the Keynote of Chicago Section Meeting

Several patriotic demonstrations were features of the meeting of the Chicago Elevated Railroads section, held on Nov. 20. About 150 members and guests were present. B. J. Fallon, engineer maintenance of way and president of the section, delivered a short address, in which he reviewed the past and future work of the section. H. A. Johnson, master mechanic, outlined briefly what had been accomplished with coasting clocks, saying that the results were highly encouraging in view of the short time they have been installed.

The entertainment of the evening was begun by the singing of "America" by the entire audience. Mr. Murphy, one of Chicago's "Four Minute Men," next gave a short talk on "What We Are Fighting For." He was followed by Sergeant Desmond, of the British-Canadian Recruiting Mission, who told of his training and service in France. J. H. Mallon gave several recitations, and Mr. Foldvary, of the treasurer's office, rendered some violin solos. Mr. Tobin played several selections on his Irish bagpipe, which were novel, as many in the audience had not previously heard the instrument. The program was concluded with the singing of "The Star Spangled Banner."

The address delivered by R. E. Danforth before the Public Service Company section at Camden last spring has been reprinted by the company from the issue of the *ELECTRIC RAILWAY JOURNAL* for Oct. 20, 1917. Each member of the section has received a copy.

The Moose Jaw (Sask.) Electric Railway desires to adopt one-man cars and will ask the Saskatchewan Legislature to amend the section of the railway act which specifies that two men shall be in charge of a car. The City Council, it is said, will support the amendment.

# EQUIPMENT and MAINTENANCE

HAVE YOU A GOOD WAY  
OF DOING A JOB?

—*Pass It Along*

These Articles Have Been Selected to Provoke Thought and Stimulate Discussion. All of the Technical Departments Are Represented

## Rail for Paved Streets

The Tram Girder Rail Possesses a Number of Advantages Over the Grooved Section and Is Being Extensively Used

BY MARTIN SCHREIBER

Chief Engineer Public Service Railway, Newark, N. J.

It may be of interest to electric railways to be apprised of the recent decision of the Public Service Railway Company with regard to proper rail for paved streets. To be sure, many of the franchises specify the type of rail. Still others leave it to the governing authorities. But, in the final analysis, the matter generally resolves itself into a discussion and often a mutual agreement between the railway company and municipality. For this reason, the Public Service Railway Company has taken the initiative and approved the following types of construction:

Our first choice is the 80-lb. standard section of the American Society of Civil Engineers T-rail, laid with stone block pavement flush with the head of the rail and with the flangeway cut into the stone abutting the gage line. Fig. 1 shows a model of this type.

Our second choice is to lay a high T-rail, American Electric Railway Engineering Association 80-lb. standard section, with stone block pavement depressed under the rail. Fig. 2 is a view of track in Main Street, Fort Lee, N. J., showing an example of this second choice of construction.

Our third choice is the tram girder rail, Lorain section No. 101/486, with stone block pavement, as indicated in Fig. 3. In our practice with this rail, the paving, as shown, is brought up flush with the head of the rail on the outside and is raised  $\frac{1}{2}$  in. above the lip of the rail on the inside, and the edge of the block is finished with a crown.

Our fourth choice is Lorain No. 116/434 section, grooved girder rail, practically the American Electric Railway Engineering Association standard, with stone block pavement, for congested parts of cities where vehicular traffic is concentrated. Fig. 4 shows a model of this type.

Of course, there will be no question about T-rail for the first choice, but perhaps some may wonder about the revival of the tram girder rail. The revival of the tram section on Public Service Railway property is principally due to the splendid performance of this section compared to the grooved girder rail, or trilby section. This is especially true where streets have not been kept clean. While in the design of the groove, the modern grooved rail is largely self-cleaning, still it will catch and hold sand, grit, pieces of metal and other debris. In winter also the groove tends to become clogged with snow and ice. The flange of the wheel traveling through this grooved rail causes unnecessary wear from grinding on the sand and grit, and due to the fact that after a few years the rail is not kept exactly to gage, there will be contact of the flange with each side of the groove. In consequence the life of the grooved rail is not more than 75 per cent that of the tram girder rail. Likewise, the equipment maintenance is increased when cars are operated over the grooved rail, due to the wearing of the wheel flanges to sharp edges. There is also greater energy consumption due to the wear and the necessity of the wheel flanges forcing this material out of the groove.

Probably a more important objection is the annoyance to property owners from the greater noise that we have in operating over the grooved rail, due to the flange of wheels grinding through the debris in the groove, and on account of the wheel treads running over

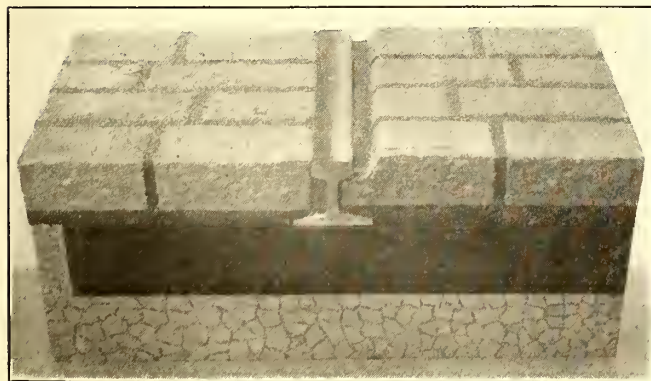


FIG. 1—STANDARD 80-LB. 5-IN. T-RAIL, A.S.C.E. SECTION—FIRST CHOICE



FIG. 2—STANDARD HIGH T-RAIL A.E.R.A. SECTION AS LAID IN FORT LEE, N. J.—SECOND CHOICE

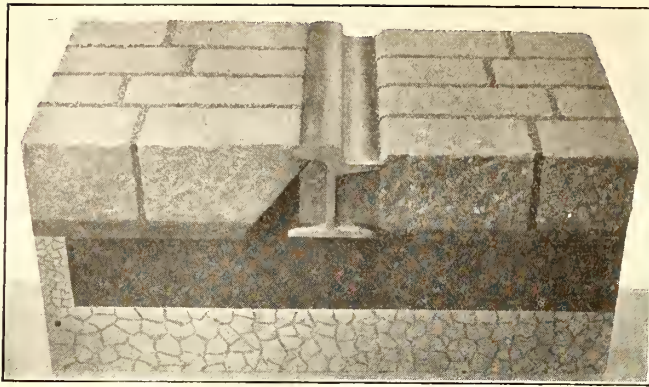


FIG. 3—LORAIN TRAM GIRDER SECTION, NO. 101-486, THIRD CHOICE



FIG. 4—LORAIN GROOVED SECTION, NO. 116-434, FOURTH CHOICE

the sand and grit that is fanned out of the groove on to the head of the rail. Another point is that the probability of derailments is considerably minimized in the tram section from the fact that the flanges are not interfered with, as in the case of flanges operating in a groove. It is plain that when the back of the wheel flange is worn to a sharp edge it is much more difficult to keep cars on the track through special work, as the wheels have a tendency to climb points of curves, switches and frogs.

Again, the flanges of wheels running in an uneven groove cause oscillation of the wheels that would be favorable for corrugations.

One of the chief objections to the tram section, when it was in vogue, was the difficulty of steel-tired vehicles

design includes the offset of the gage line from the center of the web, the thick web and wide base, the same principles that control in the standard grooved girder rail of the American Electric Railway Association.

Probably, in view of the fact that we now have had substantial and practical experience with the grooved girder rail, along with that with the tram girder rail, it would not be out of place for the way committee of the American Electric Railway Engineering Association to consider the adoption of the standard tram girder rail on those properties of the electric railway industry that saw fit to use it in their construction.

It should be noted in the illustrations that the pavement happens to be reeclipped block.

### Compromise Joint Made of Special Plates Held by Four Bolts

BY R. A. WILLSON

General Superintendent Washington Water Power Company, Spokane, Wash.

Compromise joint troubles on the system of the Washington Water Power Company have been practically eliminated by a joint designed by the writer and shown in the accompanying halftone and drawing.

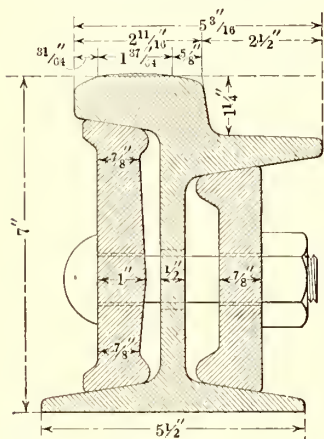


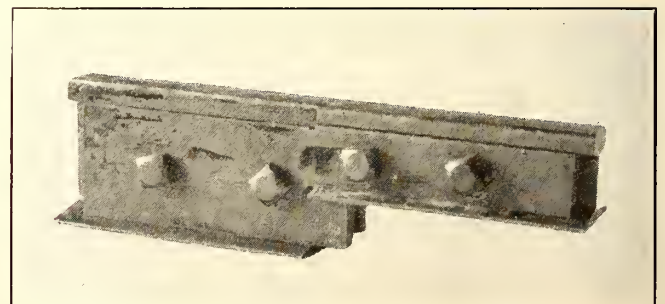
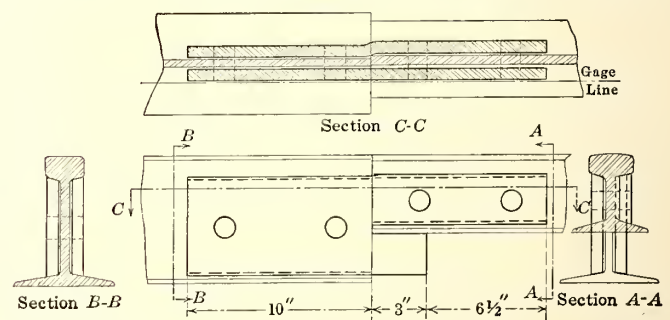
FIG. 5—LORAIN SECTION NO. 101-486, WITH DIMENSIONS

crossing and turning in and out of the tracks. This one phase of the performance of the tram rail probably had as much to do with its abandonment for the trilby rail as the fact that the trilby rail gave a smooth pavement. The advent, however, of the automobile and motor truck has largely eliminated this difficulty. A considerable quantity of new rail of the tram girder section described has been laid by the

Public Service Railway in paved streets during the past two years, notably in Orange, Montclair and Plainfield.

No claim is made here that the tram girder rail can wholly take the place of the grooved girder rail. In case of the heaviest vehicular traffic where any breaking of the smooth continuity of the pavement surface is the forerunner of a rut, we may well countenance the increase in maintenance due to the grooved girder rail as well as the possible complaints of noise from the citizens. But where the vehicular traffic is not so dense that the breaking of the smooth continuity of pavement is not controlling, then the tram girder rail is better for both the railway company and public at large.

The tram section selected by the Public Service Company is a new section shown in Fig. 5. This is a 7-in. rail, weighing 101 lb. to the yard. The principle of the



DRAWING AND VIEW OF NEW FISH PLATE FOR COMPROMISE JOINT

It is a very simple joint consisting of two fish plates, the wider sections being milled so that the smaller section of rail can be forced in, leaving a projecting anvil to support the light rail. Four bolts hold the plates and rails firmly together.

Application has been made for a patent on this joint, and it is expected that in the near future it will be modified and manufactured by the Rail Joint Company of America.

## Restoring Worn Journal Boxes and Pedestals

Wearing Plates Applied to Pedestal Guides and Journal Boxes Keep Axles Properly Aligned with Respect to Trucks

BY R. W. PALMER

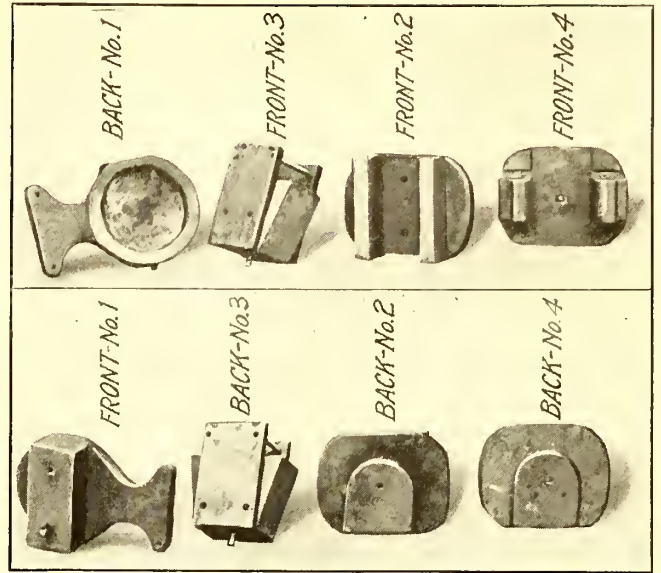
General Manager Auburn & Syracuse Electric Railroad, Auburn, N. Y.

One of the important considerations in connection with truck maintenance as far as wheel wear and efficient braking are concerned is the proper alignment of axles with reference to the truck frames. It is not only important that the axle centers be spaced the same on both sides but the axles themselves should also square up with the truck frame proper. When trucks are new this condition should and does exist on all well-built trucks, but in service, due to the wear on pedestal guides and journal boxes, the condition is considerably changed, and unless corrected will cause unequal flange wear and inefficient braking.

If the play between the pedestal guides and the journal box is abnormal, it is impossible to keep the truck frames and axles in proper alignment, as the position of the axle centers is subject to change due to the driving effect of the motors and the application of the brakes. The writer was able to secure very satisfactory results when overhauling Baldwin M. C. B. trucks which had been in operation for five years by adding wearing plates to both pedestal guides and journal boxes. The wearing plates for the pedestal guides were made from standard Carnegie C-8 section, 9-lb., 5-in. steel channel iron, machined on the face and edges to the dimensions given.

From drawing A it will be noted that the pedestal guides have been machined so that the channel fits over them in such a manner that the flange as well as the face of the channel provides wearing surfaces for the side of the journal box and for the front and back guides on the box which prevent its longitudinal movement.

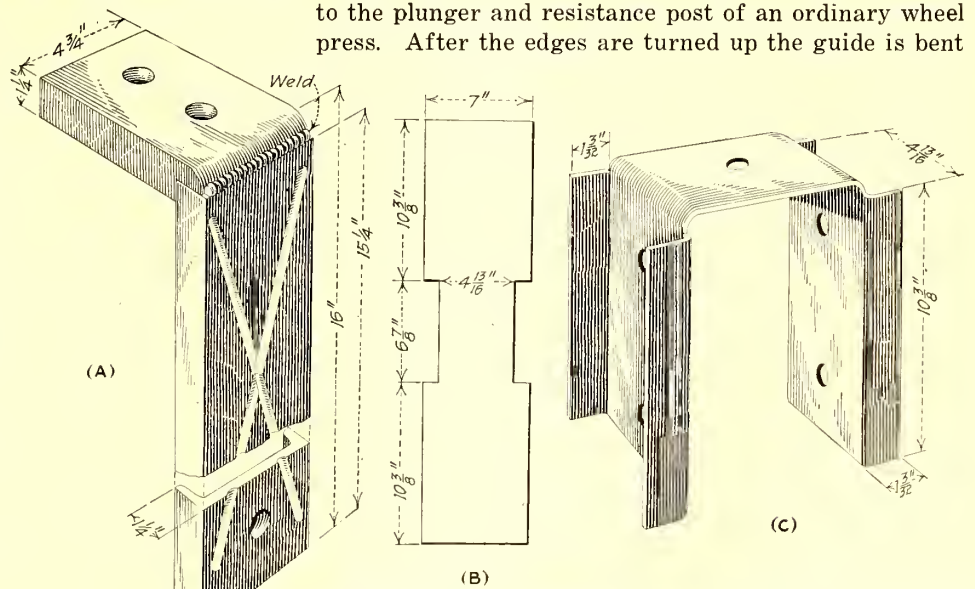
In machining the pedestal guides a sufficient amount of material is removed so that when the machined channel is placed in position the dimensions of the pedestal guides will be the same as they were originally ( $1\frac{1}{4}$  in. x  $4\frac{3}{4}$  in.). After the machining has



DIES USED IN FORMING WEARING PLATES

been done on both pedestal guide and channel iron, the two pieces are clamped together and the wearing plate is spot welded to the pedestal at the top edge, the bottom edge of the wearing plate being held in position by the clamping effect of the bolt and spacing spool located at the lower ends of the pedestal guide and under the journal box.

The wearing plates on the journal box are made from standard  $\frac{1}{8}$ -in. x 7-in. steel bars cut into  $27\frac{3}{4}$ -in. lengths and machined as shown in drawing B. After the center portion has been cut out the edges are turned up with the use of dies No. 1 and No. 2, shown in the accompanying illustration, these being attached respectively to the plunger and resistance post of an ordinary wheel press. After the edges are turned up the guide is bent



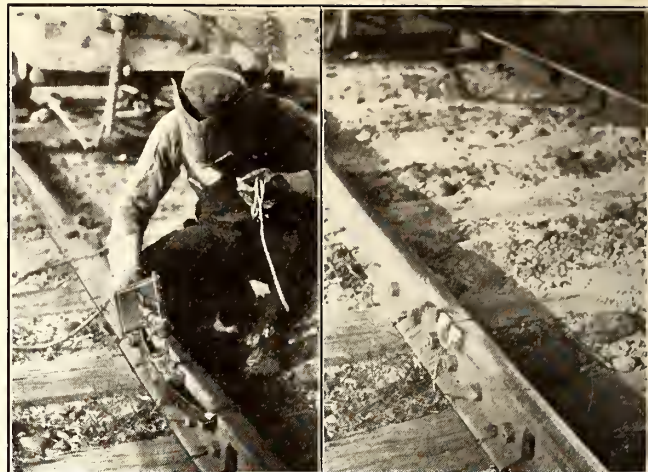
LININGS FOR WORN PEDESTALS (A) AND JOURNAL BOXES (B, C)

to the form shown in drawing C by using dies No. 3 and No. 4 in a similar manner. Only die No. 1 is fitted to the plunger head, and die No. 3, when used, is fastened to No. 1 by the side plates.

After the plates have been formed, the worn surfaces on the journal box are machined to receive the wearing plate as shown in drawing C, measurement for doing this work being taken from center lines, the proper location of which can be secured from a new

box. The wearing plates are attached to the journal box by spot welding along the lower edges and at the hole in the center of the plate on top of the box. After the dies have once been made and the guides and journal box have been machined the repair parts described can be replaced at a very nominal cost.

It is, of course, appreciated that a part of the unequal flange wear may be caused by improper center bearings or side bearings, which, on account of unnecessary friction, tend to prevent the trucks from assuming their proper alignment with reference to the car body after the car has passed around a curve. If this matter is taken care of, and also the unnecessary play between the journal box and pedestal guide, the life of wheels can be materially increased.



WELDING BOND ON 80-LB. T-RAIL. BOND IN PLACE

### Bond Welding Costs and Practices at Springfield and Worcester

The Springfield (Mass.) Street Railway, like its associate, the Worcester Consolidated Street Railway, operates a Lincoln bond welder, which it purchased in August, 1916. With this machine it has installed about 6000 bonds to date, the maximum being eighty to ninety in a nine-hour day on city lines.

The company has had no trouble in welding the copper terminal to the rail. Instances of poor welds are very rare. No change has been noted in the material of the rail at the point where the terminal is applied, except that the copper and steel alloy at the point of application of the bond. In fact, one bond which was removed from the rail had enough iron in the terminal to affect a compass needle! Incidentally, it may be noted that the intense heat of the welding process oxidizes the copper bond and makes it less conspicuous to possible thieves.

Most of the bonds have been installed on the ball of the rail, and no trouble has been experienced in the way of changes in the steel. It is the opinion of the engineering department that, due to the fact that the bond is installed on the outside of the ball of the rail, there could be considerable change in the structure of the rail at this point without causing any trouble. Usually the bonds are No. 0000.

Besides installing the bonds the machine has been used in Springfield for welding 500,000 circ. mil supplementary wires, the wire being welded to the rail at the junction of the base and web.

No difficulty has arisen from loosening of bond terminals, but there has been some breakage of copper strands in cases of loose joints. Breakage of the strand appears due to the working of the joint, to dirt working in between the strands, and to freezing. The Springfield company has not found it necessary to use the steel cover furnished by the Lincoln Bonding Company.

Data for a typical job are given in the following table:

INSTALLATION COST PER BOND, BASED ON 1400 BONDS IN CITY TRACK

(Bonds fairly close together)

Bonds .....	\$0.2600
Carbon pencils .....	0.0051
Pencil holders .....	0.0064
Carbon molds .....	0.0106
Copper .....	0.0200
Labor, bonding .....	0.1017
Labor, opening and filling .....	0.0509
<b>Total .....</b>	<b>\$0.5547</b>

On this job the bonds were No. 000, and they were installed on 5-in., 80-lb. T-rail in exposed track.

The headway of the interurban cars on the line limited the work to about forty-five-minute periods, when the car carrying the bonder was withdrawn to the nearest siding. The crew can put in fifteen bonds in the period mentioned.

In work of this kind mold plates are renewed twice per day, and carbon pencil holders give about one hour each of active service. Carbon pencils last for about ten bonds each.

For each weld about 10 in. of copper wire is required. This is discarded motor field coil wire, salvaged into bond welds. A copper bottom plate furnished by the Lincoln Company is now used on the under side of the welding mold. This, by reducing the resistance, increases the life of the carbon plates in the mold.

The welding apparatus comprises a 7-kw. motor-generator set, adjustable rheostat, and circuit breaker, all mounted in a steel cradle carried on wheels. In city service this arrangement is a great convenience.

On the interurban line the bond crew is made up



GENERAL VIEW OF ELECTRICAL BONDING OUTFIT



as follows: One man to tend trolley circuit-breaker and rheostat; one man to operate bonder under mask protection; one supervisor; one motorman. On city work, or wherever track is submerged, one additional man is required for excavation and replacement of street surface around joints.

## Relation of Resin to the Life of Southern Pine Timbers

### Resin Not a Safe Index of the Durability—Conclusions of Series of Tests to Determine the Influence of Physical Properties on Durability Are Given

The influence of the various physical properties of wood upon its durability as structural timber has been more or less an open question. A paper presented to the American Railway Engineering Association by Sanford M. Zeller, Washington University School of Botany, brings out the results of a series of investigations on this subject as carried out by the author at the Graduate Laboratories of the Missouri Botanical Garden. The experiments covered three varieties of Southern pine—longleaf pine, shortleaf pine and loblolly pine. The conclusions reached are summarized as follows:

Resin is not a safe index of the durability of the three species of yellow pine investigated. It is not only undesirable as an index, but it is not satisfactory because of the expenditure of time and labor necessary to make the resin percentage determination. The specific gravity or density of the wood materially influences its resistance to decay, the denser wood being the more durable. Specific gravity, however, cannot be determined from inspection, but it can be estimated by noting the proportion of summer wood to spring wood in the growth rings. This proves to be a safe criterion of the durability of heartwood, an increase in summer wood resulting in an increase in specific gravity.

The width of the growth rings furnishes a further index of durability, for the narrower rings show more resistance to fungus attack than broad, open rings. The age or distance of the wood from the pith of the heartwood shows no relation to durability, at least up to 16 in. in diameter. Sapwood decays irrespective of resin content, specific gravity, width of annual rings, or species of pine. Shortleaf heartwood or loblolly heartwood is as durable as longleaf heartwood, provided it has the same density. Specifications for durability of the three species of pine considered should be based on a judicious combined consideration of specific gravity, number of rings per inch and percentage of sapwood.

The results have shown that resin has no toxic effects on the fungus decay of wood, but that there are other important relations of resin to decay. For instance, its waterproofing effect on wood has much to do with the rate of decay. It is well known that wood containing less than a certain minimum or more than a certain maximum of moisture will not support the growth of *Lenzites saepiaria* and other similar fungi. Any property of the wood which will influence this balance of moisture is of importance in decay resistance. Thus if the wood contains enough resin to have a material waterproofing effect it must play a role in the durability.

However, the percentage of resin necessary for such

an influence is at present unknown, and while it may be assumed that it is at least 5 per cent or more, this would not be a safe basis for specifying decay resistance, since a piece of timber of low summer wood percentage might contain this amount of resin and yet be porous enough to be attacked by fungi. On the other hand, it is generally true, although not an absolute rule, that a dense piece of heartwood showing dark summer wood is more likely to contain at least 5 per cent resin than is a lighter piece. Hence, specifications based on higher percentage of summer wood in most cases would more nearly fulfill the requirements for durability than those based on resin content, at least until more is known concerning the influence of resin on the moisture-absorbing power of wood.

## A Possible Source of Dry Sand

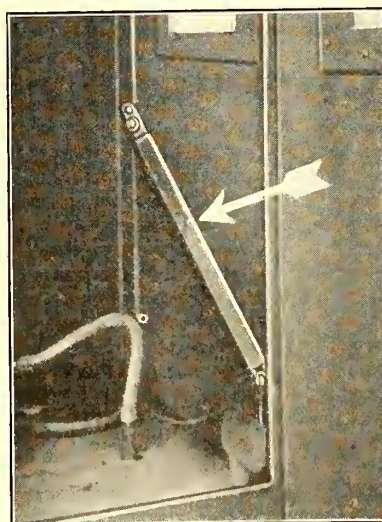
BY THOMAS W. BULPIN

Chief Engineer Los Angeles Railway

Urban and interurban electric railways and steam railroads use dry sand for sanding tracks to prevent skidding and facilitate braking. To insure dryness of their sand many roads have installed extensive and sometimes costly driers. Such driers, of course, require space and attention.

The following suggestion may apply to some roads whose plants are situated in or near cities of reasonable size. If there is in the vicinity an asphalt paving plant where ordinary asphalt paving is prepared, it will be found that driers of the most approved pattern are used in connection therewith. Arrangements can undoubtedly be made with the operators of the plant to provide a supply of hot sand, absolutely dry, delivered at any part of the railway system for little more than the cost of hauling. This procedure under ordinary circumstances would simplify what has been to many a very difficult problem.

## A Compact Steel Jacketed Heating Unit



STEEL-CLAD ELECTRIC HEATER

A flat heating unit,  $\frac{3}{8}$  in. x  $1\frac{1}{2}$  in. x  $23\frac{3}{4}$  in. in size, has been developed by the Cutler-Hammer Manufacturing Company, New York works, for use in locations where economy of space is desirable. One is shown herewith mounted on the wall of a small shelter house. The unit is protected by a steel cover and is provided with substantial terminals. The units are of 500-

watt capacity and are suitable for use in multiple up to 250 volts. Two can, of course, be used in series on a 500-volt circuit.

## London Letter

### Receipts in Liverpool Increase—Parcel Department at Bradford Very Convenient—Other Parcel-Handling Schemes Under Consideration

(From Our Regular Correspondent)

The Liverpool tramways show larger operating returns during the first nine months of the present year than during any previous corresponding period according to a report just submitted. The receipts amounted to £603,317, an increase over last year of £53,417; the passengers carried numbered 127,419,194, an increase of 9,868,437; the mileage, 9,414,628, showed a decrease of 90,303; and the earnings per car-mile were 1s 3.43d, an increase of 1.55d. The work of the department during the period under review was carried out under very strenuous conditions. The difficulty of obtaining supplies of material to maintain the rolling stock and overhead equipment in an efficient state of repair, together with the difficulty of finding substitutes for the large number of employees who had joined the forces, viz., about 2200, to repair and operate the cars, was a constant source of anxiety to those responsible. All vacancies were filled with men unfit for military service or women. In regard to war bonus to employees, the chairman said the amount paid to the various employees receiving wages or salary up to £400 a year was approximately £41,000 per annum, while the amount payable by the tramways department in making up the difference in wages between army allowance and standard rate of pay to employees who have been mobilized for military service was approximately £30,000 per annum. Up to the present, free military passes have been issued to the number of 2,950,803, equal to £13,819, and free passes to nurses to the number of 165,550, equal to £775.

The parcel department of the Bradford City Tramways has proved a great convenience, although the operations of that department have suffered from the all-round scarcity of labor. There is every probability after the war of a great development of the municipal parcel delivery service by the operation of special vans to be run on the tram lines, thus relieving the passenger cars. The introduction of the stamp system of payment for parcels on the tramways has proved a great economy, reducing the necessary number of servants very considerably. From the shopkeepers' point of view this reform may be considered a disadvantageous one, since the charges must always now be prepaid. In adopting the prepaid system, however, the tramway authorities were but copying the example set by the railway companies. In Bradford there does not appear to be any disposition to limit the distance which retail parcels shall be forwarded. By an arrangement with other tramway authorities (except at Leeds, where there is no tramway parcel delivery scheme in operation), parcels can be forwarded by tramway from Bradford for long distances. Nothing definite has as yet been done in Bradford with regard to the co-ordinating of transport services between town and town, but the subject is being carefully considered, and it is believed that a feasible scheme will be formulated soon.

The question of utilizing tramway lines for the transport of goods was brought before the Dundee tramways committee recently, when it was reported that there had lately been great developments in the south, particularly in Leeds. The Lord Provost said he should like to know the views of the tramway manager on the subject, in view of the increasing difficulties in securing sufficient horsepower. The manager stated that he believed the lines could be used profitably for commercial purposes, and it was agreed that he should frame a report on the subject.

The Wallasey Tramway employees, especially the women, express themselves as highly satisfied with the findings of the Committee on Production with regard to their application for advances in wages. The award increases the war bonus to 12s per week, in the case of the men over eighteen years of age; and to 9s per week for the women concerned aged eighteen years and over. All employees concerned under eighteen receive an increase of 1s 6d per week.

At a recent meeting of the London County Council, some criticism was expressed in regard to recent restrictions placed on the use of transfer tickets. It was contended that

there had been practically no increase, pro rata, in the traffic revenue, and great inconvenience had been caused to the traveling public. The chairman of the highways committee, in reply, said the changes were war expedients and were necessary to carry on the service at all. They had reduced the work of the conductors with good results, and he asked the Council to suspend judgment until the effect was better known. Replying to questions, he said that motormen and conductors on the Council's tramways had been required to conform to an order made by the Field Marshal commanding the home forces in November, 1916, to the effect that during air raids "the normal service of cars must be maintained." In view of recent experience, however, it had been decided, with the consent of the Field Marshal, that notwithstanding that order the cars might be brought to a standstill, and motormen and conductors take cover, but not until anti-aircraft gunfire was heard in the vicinity, the motormen and conductors to rejoin their cars as soon as gunfire had ceased in the vicinity.

At a meeting of the Bradford tramways committee recently, the application for an advance in wages of £1 per week over pre-war rates, which has been put forward by the Amalgamated Association of Tramway & Vehicle Workers, came up for consideration. The men are already receiving 12s over pre-war rates, with pay at the rate of time and a half for overtime, and the additional 8s, combined with other concessions which are being asked for, would cost the department £42,000 a year. It is a sum which the committee feels it is utterly impossible to meet without a serious increase in fares, and it has referred the question to the war wages committee, with a recommendation that the advance be not granted. The tramways committee, however, is willing that the matter should be referred to arbitration under the provisions of the munitions of war acts.

The report of the Board of Trade on the tram accident at Dover, which resulted in the death of the conductress and ten passengers, has been issued. It holds that the accident was caused by the driver failing to cut off the power as he approached the compulsory stopping place on the summit of Crabble Hill, and by his further failure to utilize properly the sand and brake equipment. It says further that the driver was discharged from the army because of nervous breakdown due to heat and overwork, after fifteen months' service in Egypt, that nerve and experience are necessary qualifications for tramway drivers, and that men discharged as unfit for military duties owing to nervous breakdown are unlikely to prove suitable, two months later, as drivers on difficult routes. The fact must be faced, the report says, that the war has materially reduced safe working conditions on tramways. It is better policy to close a route of this description if the number of experienced drivers is insufficient to work it than to employ men who have not, as a general rule, sufficient experience.

The threatened strike on the Leeds city tramways has been averted. It is said, however, that the situation still requires careful handling and the utmost toleration on the part of the authorities if disaffection is to be avoided. The trouble arose over the appointment, for the duration of the war, of six women inspectors to supervise the work of the women conductors on the tramcars. The appointments were made from among the women themselves, but at once there were protests. The contention was that the inspectorships should have been given to former employees of the corporation tramways department who have recently been discharged from the army. The tramways committee pointed out that before considering the appointment of women as inspectors it had carefully examined all male conductors in the service who were suitable for appointment to the full duties. At a meeting between members of both parties the representatives of the employees brought forward the names of several conductors with records of long service and suggested that if these men could be appointed, even though they were not able to perform the full duties of ticket inspectors, it would meet the situation. This has been agreed to, and it is hoped that one or two of the men will be selected for modified duties. These appointments will be in addition to those of the six women. The committee will endeavor to make appointments in the future, as in the past, from men returned from active service or any other male employees who may be found suitable. A. C. S.

# News of Electric Railways

Traffic and Transportation

Financial and Corporate

Personal Mention

Construction News

## Commissioner Discusses City Ownership

**Neither the Pursuit of a Political Theory Nor Ready Relief to Distressed Companies Should Impose Upon the City the Ownership of Properties That Business Judgment Would Not Advise**

Travis H. Whitney of the Public Service Commission of the First District of New York discussed the transit situation in New York on Nov. 22 at Flushing, Long Island, before the Chamber of Commerce of the Borough of Queens. Mr. Whitney said that he was not interested in possible municipal ownership of the surface railways from the point of view of political propaganda or from the point of view of financial difficulties of the street railroads. His interest was this, that having invested more than \$200,000,000 in transportation during the course of nearly twenty years, the city, from a business point of view, should have the power to secure such control or ownership of the surface lines as would allow synchronization of rapid transit and surface lines. Mr. Whitney said in part:

"The original layout of the dual system will be completed within two or three years, yet the dual system is not likely to be finished for many years to come. Great as is the investment in new facilities, the present dual system does not provide a permanently adequate and comprehensive transportation system. There are congested sections still uncared for, and there are still great areas that cannot develop properly until they are provided with transportation.

"Already the commission has under consideration certain important additions to the system in Brooklyn: The Ashland Place connection, the Adams Street relocation, and two or three new stations. The commission also felt strongly that the Third Ward of Queens should be brought within the sphere of rapid transit, and ultimately it will be. Under the dual contracts the city may, from time to time, build extensions which the companies are obliged to operate.

"Wise as was the provision in the dual contracts for the operation of new extensions, it is now fairly clear that a further step must soon be taken. The war is already rapidly convincing the public of the necessity for direct governmental control, and even operation of activities necessary to the national interests.

### CITY OWNERSHIP PLAN

"Two decades ago the city of New York determined upon the municipalization of transportation. The city now has more than \$200,000,000 invested in transit properties, and has, in municipal ownership, the great trunk transit lines, those municipally owned as well as those privately owned.

"At the present moment I am interested in the problem of co-ordinating the various classes of transportation into a comprehensive transit development. Has not the time now been reached when consideration should be given to bringing the street surface systems into a relation with rapid transit lines perhaps similar to that of the privately-owned elevated lines? As new rapid transit lines are placed in operation it becomes apparent that the public is not completely served exclusively by a rapid transit system or exclusively by a street surface system.

### HOW CO-ORDINATION OF LINES WOULD HELP

"The most striking illustration of this is in Brooklyn, where subways and elevated roads built by the city are being operated as a unit with privately-owned elevated lines. At the same time, a great network of surface lines, although controlled by the same holding company, is being operated as an independent system. Yet there are many portions

of the borough that could be better served if it were possible to co-ordinate the surface with the rapid transit lines. In many instances the surface lines would be good feeder and distributor lines or could supplement the rapid transit lines.

"It is not sufficient, however, to say that transfers can be provided, for a system of exchange of transfers between privately-owned and operated surface lines and a municipal system where the city is responsible for deficits, would be of serious financial concern to the city. The surface lines would profit by increased short-haul traffic and the rapid transit lines would suffer by securing long-haul traffic at half-fare. Manhattan is another illustration, with cross-town lines that could be utilized.

### CONTROL OF SURFACE LINES

"Consequently, the commission cannot hope to utilize the surface lines in the proper way until there is a more complete method of public control of the surface lines. It should be possible to work out a plan whereby leasehold or ownership of surface lines could be secured and thus make possible a more satisfactory unification of transportation. The city through the dual contracts now controls the transportation field, and it is inevitable that such control shall be further extended.

"The surface companies are alleging a serious financial situation resulting from increased cost of labor and material, taxes, competition of rapid transit and bus lines, and other causes with which you are doubtless familiar. They will proceed shortly to the presentation of evidence bearing upon such allegations. They are completing expensive and detailed valuations of their properties, useful alike for rate purposes and for sale purposes.

### MUNICIPAL OWNERSHIP THE VOICE OF A FRIEND

"It may be that the surface companies regard their financial condition as so serious that they did not consider recent political propaganda as an unfriendly act, but rather as the voice of a friend expressing a principle that with proper relations and sympathies could afford relief of a most satisfactory character. It is therefore most important that neither the pursuit of a political theory nor ready relief to distressed but deserving companies should impose upon the city municipal ownership of properties that cold business judgment would not advise.

### THE CITY IN BUSINESS

"The city is in the business of transportation, and should extend that business as the interest of the city requires. It should not extend the business if interests other than those of the city would solely be benefited, and it should not extend the business merely because it is a beautiful thing to be in the business of transportation.

"The rapid transit act now authorizes the commission, in co-operation with the Board of Estimate, to lay out and construct rapid transit lines, and to contract for their operation, or, if no contract can be made for operation, to operate the lines directly. The commission may also lease trackage rights, or even purchase lines for rapid transit purposes. It would be comparatively easy to extend the rapid transit act so as to authorize the purchase or lease of surface-line properties useful for transit purposes and their operation in conjunction with the city's rapid transit lines.

"If from any point of view the acquisition of public-service properties by the city is contemplated, the closest scrutiny and the best co-operation will be essential to insure, first, that the city gets only property necessary and useful to it, and, second, that the terms of acquisition are reasonable."

## Basis of Northern Ohio Settlement

The proposition of the Northern Ohio Traction & Light Company, Akron, Ohio, upon which the recent strike was settled, was as follows:

In reference to the conference held to-day between your representatives and the officials of this company, we have expressed to you a desire to do everything in our power to bring an end to the deplorable conditions now existing. With that thought uppermost in our minds, and confirming what we have verbally said, we propose that all existing contracts between the company and its motormen, conductors and brakemen be continued to May 1, 1918, which is the date of their expiration. Further, that the present wage scale be increased as of Nov. 1, 1917, as follows:

ALL CITY DIVISIONS		
	Present Wage	Proposed Wage
First year.....	28 cents an hour	33 cents an hour
Second year.....	30 cents an hour	35 cents an hour
Third year and thereafter.....	33 cents an hour	38 cents an hour
ALL SUBURBAN DIVISIONS		
First year.....	29 cents an hour	34 cents an hour
Second year.....	31 cents an hour	36 cents an hour
Third year and thereafter.....	34 cents an hour	39 cents an hour
ALL INTERURBAN DIVISIONS		
First year.....	30 cents an hour	35 cents an hour
Second year.....	32 cents an hour	37 cents an hour
Third year and thereafter.....	35 cents an hour	40 cents an hour

These revised wage scales shall remain in effect until May 1, 1918.

There shall be added to each of the existing contracts an arbitration clause to cover any disputes that may arise between the parties as to working conditions up to May 1, 1918.

There shall also be added to each of the existing contracts a provision that the parties to the existing contracts shall, on April 1, 1918, begin negotiations for new contracts between the company and the motormen, conductors and brakemen, which contracts shall cover wages and working conditions from May 1, 1918, to May 1, 1919.

In the event that the said parties are unable to formulate contracts agreeable to both, then the subject shall be submitted to arbitration.

The wage scales and working conditions of the new contracts of May 1, 1918, shall be binding upon all parties for one year, effective from May 1, 1918.

## Power Agitation in Kansas City

Factional agencies in business and politics are making use of war-time conditions to keep unsettled the attitude of the people in regard to public service corporations that furnish electricity to the consumers in Kansas City, Mo. These agencies appear to be divided in two, the city officialdom and those who favor municipal ownership of public utilities.

In Kansas City the city has a member on the board of control of the Kansas City Railways. This member favors the present arrangement whereby the city has a share in selling electricity made by the railway. This company pays the city a percentage of the receipts from current sold to the Kansas City Light & Power Company. The State Public Service Commission has ruled that the railway and the light company shall be permanently divorced. The light company, therefore, contemplates building additional plants to make its own current. This move is opposed by the city officials because of the resultant loss of revenue to the city.

Other persons are seeking to secure a municipal plant in the city and are opposed to the present light company building a new plant. They believe that if matters remain as they are at present the light company will be unable to give good service during the war times and the municipal argument will have been thereby enhanced at the close of the stringent times.

As a result of the work of these two factions, and due partly also to the tendency of the public to guard against extravagance in the use of building materials at this time, complaints have reached the priority board asking that the light company be not allowed to build the new \$4,500,000 plant which it had counted upon to fulfill service needs in the city. Others have appealed to the priority board, carrying to it the other side of the question. As a result the board is now considering both angles before passing a rule regarding the shipment of materials for the new plant.

The city contends that the Kansas City Railways should enlarge its present power plant and continue selling electricity to the light company. The railway officials believe that their plant would not need additional equipment if the light company were allowed to build its plant.

## New Franchise for Cincinnati Interurban

The first move of the interurban railways to improve their service in Cincinnati, Ohio, and co-operate with the city in its plans to the same end indicates that the city government is willing to forego some of the old-time precedents to aid them. A new franchise for the Cincinnati, Lawrenceburg & Aurora Electric Street Railway, presented to the City Council on Nov. 20, contained a requirement that the company should pay an annual rental of \$1,500 a year after the first five years. At a hearing before the street railway committee the following day, Attorney Stanley Shaffer asked that the beginning of payment of rental be placed at a later date, as the company was now in the hands of a receiver and was finding it difficult to finance improvements. Members of the committee agreed to amend the draft to make the payments begin at the end of ten years. They said they wished to encourage interurban roads to come into the city and to co-operate with plans that have been made for rapid transit service.

Under the new franchise the company will abandon the old route on the Lower River Road at a point 3 miles west of Anderson's Ferry and build a new track on private right-of-way along Commercial Avenue. Application has been made to the Public Utilities Commission to abandon this portion of the track.

As far as practicable the ordinance follows the form of the franchises granted the Cincinnati Traction Company and the Cincinnati, Newport & Covington Street Railway. The city reserves control of operation and the company must give bond to restore the streets to their original condition.

## Change of Venue Proposed

Court Feels This Course Desirable on Account of Prejudice Growing Out of Strike

The Springfield (Ill.) Consolidated Railway has been conditionally allowed a change of venue in twenty-six damage suits, totaling approximately \$200,000, on the grounds that prejudice existing in Sangamon County, Illinois, in the Circuit Court of which county the cases are now resting, would make impossible the insuring of a fair trial. Announcing that he would grant the petition Judge Norman L. Jones said that he would take under advisement the selection of the counties to which the cases would be transferred. He said that the transfer of the cases would be conditional upon agreements being made in the meantime between the attorneys for the litigants relating to the continuance of the cases until the present unsettled condition due to the strike has been ended. In deciding in favor of the company, Judge Jones said:

"There has been tremendous feeling here. I do not know who is to blame, nor does that concern this case; but there has been a condition here which has made the average citizen feel that it is unsafe to ride on the cars. The denial that the acts against the company—and the acts have not been denied—have been committed by the labor men makes the stronger case for the petitioner. It is evident that the feeling has spread to further bounds than that of organized labor. This condition is not over. The situation is such that it cannot help breed prejudice. I would rather leave these cases here where they ought to be tried under normal conditions, but where the parties to a suit cannot be assured of a fair trial in their home county it is the duty of the court to send the trial where they can get justice. I shall let this matter hold over as to term and as to place of trial and give that decision later. Unless the attorneys in these suits can come to an agreement as to the continuance of the cases until this prejudice ceases to exist I shall grant the change of venue and shall be governed largely by the convenience of the parties in the selection of the places for trial."

## Labor Charges Not Sustained

Charges against the Twin City Rapid Transit Company, Minneapolis, Minn., by representatives of striking employees were found to be without foundation after investigation and hearing by a special committee of the Public Safety Commission. A recommendation that insignia of organization be dropped was included in the resolutions. The committee was made up of Rev. Dr. S. F. Kerfoot, president of Hamline University; W. M. Jerome, Minneapolis, attorney, and Norman Fetter, St. Paul, credit man. The recommendations follow:

"1. The total disuse is recommended of buttons or other insignia, symbolizing the union or the non-union organizations, except that the committee sees no objection to the use of the badge of the Employees' Mutual Benefit Association, to which all employees receiving a salary less than \$2,500 a year are eligible.

"2. All solicitation for membership for the union as well as for the non-union organizations shall cease on the company's property.

"3. The company should post in all its stations rules for the purpose of effectuating the foregoing recommendations, with a provision that a violation shall be cause for discipline.

"4. Your committee recommends that the employees and the public be requested to avoid unfriendly discussion."

## Wages Increase in Spokane

C. R. Stiles, superintendent of the Washington Water Power Company, Spokane, Wash., on Nov. 13 announced another increase in wages for conductors and motormen. The increase was voluntarily granted. It is the third this year and means a further advance of practically 9 per cent for the men who have been for five years or more in the company's service. According to Mr. Stiles, conductors and motormen on the regular runs can now earn from \$125 to \$140 a month. The average wage of the 200 men affected will exceed \$100 a month. The new schedule is based on the one recently adjusted by mediation in Tacoma. A table giving the new and the old scales in cents per hour follows:

New Scale		Old Scale	
First six months.....	31	First six months.....	30
Second six months.....	32	Second six months.....	31
Third year.....	33	Third six months.....	32
Fourth year.....	35	Fourth six months.....	33
Fifth year.....	35	Third to fifteenth year, inclusive.....	35
After fifth year.....	38	After fifteen years.....	37
Operating one-man cars per hour additional over above.....	4	Instructing students, extra per hour.....	5
Instructing students, extra per hour.....	5	Additional per hour for operating one-man cars.....	4
Minimum wages for extra man, per month.....	\$80	Guarantee for extra man, per month.....	\$65

## Temporary Restraining Order in Seattle

Judge Calvin S. Hall of the King County Superior Court, at Seattle, Wash., in the case of T. N. Haller against the city of Seattle, seeking an order restraining the city from proceeding with the construction of an extension of the municipal railway from the north end of the Ballard bridge over Fifteenth Avenue N. W., and Leary Avenue to its intersection with Market Street, on Nov. 7 granted a temporary restraining order. The court, however, approved the ordinance adopting a plan for an extension of the city line to Market Street and Leary Avenue, and the issuance of \$40,000 of utility bonds therefor, interest and principal to be paid from the earnings of the municipal railway system. The city had until Nov. 16 to submit proof by affidavit or otherwise of the solvency of the street railway construction fund, created by the authorization by the Council of a bond issue of \$40,000.

The temporary orders were dissolved which restrained the city from proceeding with an approach to the Ballard bridge from Thirteenth Avenue W., and Nickerson Street, with \$17,000 appropriated from the bridge bond fund, and for the purchase of a submarine cable to transmit power to the bridge.

## Cleveland Commissioners Accept

Charles A. Otis, Charles E. Adams, M. A. Bradley, Street Railway Commissioner Fielder Sanders and City Finance Director C. J. Neal on Nov. 21 filed with Mayor Harry L. Davis their acceptances of appointment as members of the rapid transit or subway commission of Cleveland, Ohio. The appointments were made more than a week before. Their duties in connection with the proposed subway system and underground terminal will be much the same as the local Cincinnati Commission, which has prepared the way for building a rapid transit loop.

Officers of the Cleveland Rapid Transit Railway Company, organized to build underground railways, said that before the new commission can commence construction work on municipal subways, its franchise must be formally revoked by the City Council. This franchise was granted in 1909 and has since been renewed several times to allow the company to finance its proposition. Although the company has done no work, it is contended that the franchise is valid until formally revoked. W. R. Hopkins is president of the company and Thomas P. Schmidt, secretary and treasurer.

## Injunction Against Strikers

The Chattanooga Railway & Light Company, Chattanooga, Tenn., has been granted an injunction against the Amalgamated Association. The injunction was filed in the form of an amendment to the original bill filed several months ago seeking to prevent the employees of the local union from going on strike a second time after entering into agreements with the company. The original bill was filed several hours after the men went out on a strike. The amendment restrains the defendants from in any manner undertaking to induce, persuade or coerce the employees of the company to breach their contracts of employment or to leave the employment of the company. The bill further charges that the company in order to continue in business and perform its duties has been compelled to procure the services of other employees with which to operate its cars, and now has in its employ, as operatives, about 160 men, each of whom has signed a definite individual contract.

## First Gas Squad Organizing

The first battalion of American soldiers to meet offensively the gas and fire which the enemy introduced in warfare is being organized as the Thirtieth Engineers, Gas and Flame, with headquarters at Camp American University, Washington, D. C. Major E. J. Atkisson, Corps of Engineers, a graduate of West Point and of Cornell, is in charge of organization. Although the gas and flame service was authorized as recently as Oct. 15, rapid progress has been made in organization, but there is still an opportunity for a limited number of enlistments for electrical experts, mechanics, blacksmiths, carpenters, clerks and muscular, quick-thinking, resolute men, between the ages of eighteen and forty years. Any man possessing the necessary qualifications may volunteer at any recruiting station by asking to join the Thirtieth Battalion Gas and Flame, forming at Washington.

## Increase in Wages in Charleston

The officers of the Charleston Consolidated Railway & Lighting Company, Charleston, S. C., have signed a contract with a committee representing the trainmen which gives the men an increase of 3 cents an hour, effective immediately. The question of wages is the only change made in the agreement. The contract is for one year. The men are paid according to term of service and classification, which ranges from 19 cents an hour for extra men to 25 cents an hour for men who have been in the service of the company continuously for four years. The following table shows the old and new rates in cents per hour:

	Old Rate	New Rate
Extra men.....	19	22
Regular men.....	21	24
Two-year men.....	23	26
Three-year men.....	24	27
Four-year men.....	25	28

## Increase in Wages in Louisville

An increase rated at 3 cents an hour has been awarded to the 1200 conductors and motormen in the employ of the Louisville (Ky.) Railway by a decision of the board of directors made on Nov. 23. It dates from Nov. 16 and supercedes a 7½ per cent bonus which became effective last May, graduating the increase according to the length of a man's service. For example, the motorman or conductor who had served five years or longer was paid at the rate of 25 cents an hour and with his bonus added received \$2.69 a day on a ten-hour basis. Under the new system this employee will receive \$2.80. The old rate was 21 cents an hour for the first year men; 22 cents for the second year; 23 cents for the third year, 24 cents for the fourth year and 25 cents for all who had served five years or more. The increase means a flat advance of 3 cents an hour to all trainmen. It will add about \$150,000 a year to the payrolls.

## Trenton Officials Indicted

The officers and directors of the Trenton & Mercer County Traction Corporation, Trenton, N. J., have been indicted by the Mercer County Grand Jury on charges of maintaining a common nuisance in illegally having poles and wires on certain streets of the city of Trenton, N. J. The indictments followed action by the members of the City Commission. The indictments contain fifteen counts, specifying the illegal use of that number of streets. Indictments were also found on fifteen counts against the directors of the three corporations from which the present lines were leased. Three separate indictments containing fifteen counts each have been found against Messrs. Riggs, Roebing, Ginnelly, Jones and Grookett because they are all directors in three of the corporations owning the Trenton system.

## San Francisco Strike Declared Off

The strike declared by conductors and motormen of the United Railroads, San Francisco, Cal., last summer was formally abandoned on Nov. 24 when the union asked the local labor council to remove its boycott, which was done. The men organized a union and demanded \$3.50 for an eight-hour day. The company refused to recognize the union. Permission is given the men to seek work with the company as individuals. The progress of the strike was reviewed from week to week in the *ELECTRIC RAILWAY JOURNAL* so long as the controversy was regarded as a real issue.

## Men Balk at Arbitration Provision

Following the refusal of the Twin City Rapid Transit Company, Minneapolis, Minn., to allow trainmen wearing buttons to take out cars during the week beginning Nov. 26 the Minnesota Public Safety Commission gave the union men until Nov. 29 to decide to return to work. The company was instructed to reinstate applicants who obeyed the commission's order. When the commission ended the recent brief strike it named an investigating committee on unsettled complaints. This committee, as noted on page 1005 of this issue, recommended that all union insignia be removed. The company enforced this recommendation on Nov. 25. On the following day the commission made the order mandatory. The union men rebelled and the Trades & Labor Assembly asked the removal of Commissioner J. F. McGee. R. S. Coleman, local federal mediator, is at work. The company claims that its service is 91.76 per cent normal. It says it is up to the men to carry out the commission's order.

**Municipal Officials Demand Valuations.**—In a recent letter to the Public Service Commission for the Second District of New York the committee of city attorneys appointed by the Mayor's Conference urged the valuation of electric railway property before the granting of fare increases. It was alleged that the petitioning companies are over-capitalized.

**Request for Increase in Wages in Toledo.**—Motormen and conductors of the Toledo Railways & Light Company,

Toledo, Ohio, have requested an increase of 10 cents an hour in wages. The present contract with the men expires in April, 1919. The scale of pay now in force is from 27 cents to 31 cents an hour, according to the length of time the men have been in the service.

**Objection to Bus Grants at This Time.**—Mayor-elect John F. Hylan of New York sent a letter to the Board of Estimate on Nov. 27 protesting against any grant to the Fifth Avenue Coach Company of rights to operate in streets not covered by the company's present franchise. In his letter Judge Hylan urged that any new grant to the company be deferred for at least ten days to enable the incoming administration to investigate, and that nothing be done until there had been adequate publicity regarding the terms on which the grant was to be made.

**Women Car Cleaners in Trenton.**—The Trenton & Mercer County Traction Corporation, Trenton, N. J., has been compelled to engage women as car cleaners at the carhouses because of the scarcity of male help. Both day and night shifts of women are engaged in the work. It is the first time in its history that the corporation has taken such a step. Rankin Johnson, president of the company, said to the correspondent of the *ELECTRIC RAILWAY JOURNAL* in Trenton: "We must now look to women to do the work in the carhouses. Men will apply for work and remain only a day, being offered better wages elsewhere. The women will receive every protection and will be paid good wages."

**West Side Commission Completed.**—The commission appointed to inquire into the progress made in the settlement of the West Side improvement plan for New York has been completed by the appointment of Hiram C. Todd, Saratoga Springs. He was named by Senator Brown, temporary chairman of the Senate. The other members are Danforth E. Ainsworth, named by Speaker Sweet, and the following named by the Governor: W. H. Van Benschoten, chairman; Prof. Charles A. Beard, Cyrus C. Miller, Henry L. Stoddard and Ralph S. Rounds. The West Side improvement contemplates the rebuilding and electrification of the line of the New York Central Railroad on the west side of the city of New York along the Hudson River front.

**Fare Pleas Widely Distributed.**—E. J. Cooney, executive assistant of the Rhode Island Company, Providence, R. I., has distributed widely throughout Rhode Island to business men, state and city office holders and members of business organizations, etc., copies of the paper read by Rathbone Gardner, chairman of the board of directors of the company, and copies of a paper read by A. E. Potter, president of the company, at a recent hearing held in the State House relative to a 6-cent fare. These papers were read in answer to criticism by members of the People's Forum, Socialists, etc., and are believed to have had a great deal to do with impressing people with the necessity of an increase in revenue for the company. The statements were referred to at length in the *ELECTRIC RAILWAY JOURNAL* of Nov. 3, page 818.

**West Side Improvement Report.**—The joint conference committee of the Public Service Commission for the First District of New York and of the Board of Estimate and Apportionment of New York City, on the New York Central Railroad west side improvement, of which Public Service Commissioner Charles S. Hervey is chairman, has adopted and submitted to the Board of Estimate and Apportionment and the Public Service Commission a report indicating the different steps which the committee has taken since its organization last June. The committee has asked the Board of Estimate and Apportionment, as the next step in the solution of the West Side problem, to repeal the municipal ordinance of 1847 and subsequent resolutions under which the railroad holds its present rights to the use of public streets. The committee also stated in its report that additional facts in reference to the real estate rights of the railroad would be the subject of a later communication. These matters, the committee reported, required consideration and action, separate and independent of the power granted to the Public Service Commission, which on and after Dec. 1 will have the duty of eliminating grade crossings on the railroad's lines on the West Side. The committee also reported that the New York Central Railroad had declined to enter into any agreement with the city under the Ottinger-Ellenbogen act, which created a joint committee.

# Financial and Corporate

## Annual Report

### Virginia Railway & Power Company

The comparative income statement of the Virginia Railway & Power Company, Richmond, Va., for the years ended June 30, 1916 and 1917, follows:

	1917		1916	
	Amount	Per Cent	Amount	Per Cent
Revenue from railway operations .....	\$3,256,791	53.88	\$3,172,862	56.20
Light, power and gas revenues .....	2,787,704	46.12	2,472,296	43.80
Total operating revenues .....	\$6,044,495	100.00	\$5,645,158	100.00
Railway operating expenses:				
Maintenance of way and structures .....	\$238,681	7.33	\$251,424	7.92
Maintenance of equipment .....	201,849	6.20	180,611	5.70
Traffic expenses .....	8,707	0.27	8,725	0.27
Transportation expenses .....	1,095,157	33.63	1,006,422	31.71
General expenses .....	338,294	10.38	342,205	10.79
Total .....	\$1,882,688	57.81	\$1,789,387	56.39
Light, power and gas expenses .....	1,058,604	37.97	886,792	35.87
Total operating expenses .....	\$2,941,293	48.66	\$2,676,179	47.41
Operating income .....	\$3,103,202	51.34	\$2,968,979	52.59
Other income .....	98,391	1.62	96,610	1.71
Gross income .....	\$3,201,593	52.96	\$3,065,589	54.30
Taxes and licenses .....	387,672	6.41	327,631	5.80
Income applicable to fixed charges and rentals .....	\$2,813,921	46.55	\$2,737,958	48.50
Fixed charges and rentals .....	1,429,385	23.65	1,415,036	25.05
Surplus over fixed charges and rentals .....	\$1,384,536	22.90	\$1,322,922	23.44
Depreciation .....			\$100,000	1.77
Proportion of discount on securities .....	\$30,315	0.49	30,316	0.54
Net miscellaneous charges not operating .....	162,133	2.69	38,488	0.68
Total direct charges .....	\$192,448	3.18	\$168,804	2.99
Surplus over fixed and other charges .....	\$1,192,088	19.72	\$1,154,118	20.45

The gross earnings, in both the railway and the light and power departments, increased in the last year more than the normal growth, owing to army and navy camp traffic in the latter part of the period. The gross earnings from operation increased \$399,337, or 7.07 per cent. The greater part of this gain, \$315,408, or 12.8 per cent, was in the light and power department, while the railway increase was \$83,928, or 2.6 per cent. The gross income from all sources increased \$136,003, or 4.44 per cent.

The operating expenses, however, showed a rise of \$265,114, or 9.90 per cent, divided \$93,301, or 5.2 per cent, for the railway department, and \$171,812, or 19.4 per cent, for the light and power department. Most of the increase in the railway department was for conducting transportation, which cost \$88,735 more than the year before. Maintenance of way and structures decreased \$12,742, but maintenance of equipment rose \$21,237. The maintenance expenditures amounted to 13.53 per cent of the gross railway earnings in 1916-1917, as compared to 13.62 per cent the year before.

In the last year the policy of setting aside a reserve for depreciation was discontinued. The directors, however, authorized the transfer from the surplus as of June 30, 1917, of the sum of \$359,903 to the accumulated reserve. This amount was equal to 6 per cent of the gross earnings of the system, except the Norfolk & Ocean View Railway, which had no surplus earnings. The balance in the reserve at the end of the year was \$1,342,781.

The company experienced difficulty in holding competent men in all departments, notwithstanding voluntary wage increases granted to the men. The higher rates of compensation were largely influenced by the high wage scales paid in munitions plants and construction work for the government, both of which were extensive in the company's territory. The wages of motormen and conductors were increased by a total of 5 cents an hour during the year. This alone will mean an annual increase of \$162,000.

The expenditures for additions, extensions and betterments were \$444,244 for the last year. Of this amount \$88,376 was for the railway department. Various statistics follow:

	1917	1916	Change
Revenue passengers carried .....	69,807,331	67,226,456	+2,580,875
Transfer and free passengers .....	17,865,823	16,980,726	+885,097
Total passengers carried .....	87,673,154	84,207,182	+3,465,972
Percentage of passengers using transfers .....	19.56	19.33	20.23
Average fare per passenger, including transfers .....	\$0.037	\$0.037	.....
Car-mileage .....	13,547,644	13,750,325	-202,681
Car-hours .....	1,618,215	1,645,521	-27,306
Total revenue per car-mile .....	\$0.240	\$0.231	+\$0.009
Total revenue per car-hour .....	\$2.013	\$1.928	+\$0.085
Operating expenses per car-mile .....	\$0.139	\$0.131	+\$0.008
Operating expenses per car-hour .....	\$1.164	\$1.088	+\$0.076

## O., A. & E. Rehearing Denied

### California Railroad Commission Will Insist Upon the Fulfillment of the Requirement for the Readjustment of Finances

The Railroad Commission of California has denied the owners of a small percentage of the outstanding bonds of the Oakland, Antioch & Eastern Railway and the Oakland & Antioch Railway a rehearing of the commission's decision, in which it authorized a refinancing of the Oakland, Antioch & Eastern Railway by an issue of \$1,095,000 of first mortgage bonds, and \$262,000 promissory notes. The applicants for a rehearing stated that they had not properly exercised the authority granted by the commission; that the company was insolvent, and that the issue of bonds would be in violation of the lawful rights of the bondholders.

In the commission's decision rendered on Nov. 19, it said that the railway had in 1914 fallen into financial difficulties so that to avoid receivership, it was necessary to take care of the interest on its funded debt, which its revenues were not sufficient to meet; that a large majority of the bondholders and the managers agreed upon a financial plan waiving the payment of interest to Jan. 1, 1918; that under a stockholders' agreement an assessment was changed into a loan by the stockholders, and that the commission authorized the company to issue the bonds and notes under certain provisions. The protesting minority bondholders insisted that the plan was doomed to failure, but the commission says that a careful reading of their petition did not disclose the results hoped to be accomplished by a revocation of the commission's order. The commission says:

"No time need be wasted discussing the so-called financial plan of the company, as it is admitted on all sides to be a failure. Nobody connected with this company or any of its securities has the slightest intention of attempting to carry out this plan. Further it is conceded that a complete and drastic reorganization of the capitalization of both companies will be necessary. The managers of the two companies and the majority bondholders insist that a plan is now being discussed for complete financial reorganization, and the commission is urged not to revoke the orders made, because such revocation would be ineffective, in that notes and bonds have been issued under it, and a revocation would not change the status of such bond and note holders. Further, the activities of the interested parties will result in a complete reorganization on which any action of the commission revoking the order would have little effect."

The commission says that the Oakland, Antioch & Eastern Railway and the Oakland & Antioch Railway are not in sound, financial condition, that the plan now in effect will in no wise improve this financial condition, and that it is necessary immediately to reorganize the companies. While the revocation of the orders would not necessarily bring about the desired result, and the application for this revocation is therefore denied, the commission calls the attention of the two railways to that part of its order, dated Nov. 20, 1915, which reads as follows:

"On or before Jan. 1, 1918, the applicant shall report to this commission a plan for the readjustment of its finances to meet its maturing obligations and to place it upon a permanent basis to meet its financial necessities."

The commission says that it will insist on the fulfillment of this requirement.

### Electric Railway Statistics

Comparison of Returns for August, 1917 and 1916, Shows Increasing Cost of Operation—Operating Ratio Has Risen to 64.33 per cent

A comparison of electric railway statistics for August, 1917, with figures for the corresponding month of 1916, made by the information bureau of the American Electric Railway Association, indicates a continued rise in operating expenses. This condition is noticeable throughout the country, although in the Southern District traffic in connection with the operation of military camps has apparently tended to accelerate somewhat the rate of increase of operating revenues.

Data for August, 1917, representing 7838 miles of line of electric railways scattered throughout the country, figured on the per mile of line basis, indicate an increase in operating revenues of 8.27 per cent, in operating expenses of 12.15 per cent and in net earnings of 1.92 per cent. Data representing approximately 70 per cent of the above-stated mileage show an increase of 7.27 per cent in taxes paid and 0.40 per cent in operating income.

The returns from the city and interurban electric railways, as shown in detail in the appended table, have been classified according to the following geographical grouping: Eastern District—East of the Mississippi River and north of the Ohio River. Southern District—South of the Ohio River and east of the Mississippi River. Western District—West of the Mississippi River.

Of the three groups shown in the accompanying table returns for the Southern apparently indicate a slight degree of improvement over the corresponding period of the previous year, while returns for the Eastern and Western are somewhat unsatisfactory. Data for the Eastern group, representing 5295 miles of line, indicate an increase in operating revenue of 7.96 per cent, in operating expenses 12.62 per cent and in net earnings 0.14 per cent.

Returns for the Western group, representing 1584 miles of line, show an increase in operating revenues of 7.33 per cent, in operating expenses 10.08 per cent and in net earnings 2.84 per cent. Returns representing approximately 95 per cent of this mileage indicate an increase of 15.38 per cent in the amount of taxes paid and a decrease of 0.36 per cent in operating income.

The operating ratio for the country as a whole increased from 62.10 in August, 1916, to 64.33 in August, 1917. The operating ratio of the Eastern District increased from 62.66 in 1916 to 65.36 in 1917, while that of the Western group increased from 62.02 in 1916 to 63.61 in 1917.

### Government Commandeers Railway

Road About to Be Abandoned Will Be Continued in Service by the Government

The United States Navy Department has commandeered the beach front electric railway of the Cape May, Delaware Bay & Sewell's Point Railroad proper for war purposes. Last spring the road was sold at receiver's sale to a junk dealer. After several contests before the Board of Public Utility Commissioners of New Jersey in an effort to have the road run for the benefit of the public the commission decided that the purchaser could do as he pleased with it. Congress has appropriated \$15,000 for placing the electric railway in shape for government use.

**Capital Traction Company, Washington, D. C.**—The Capital Traction Company has declared an extra dividend of 1¼ per cent. George E. Hamilton, president of the company, announced that the dividend was declared because of the increased business during the last six months.

**Columbus Railway, Power & Light Company, Columbus, Ohio.**—Permission has been asked by the Columbus Railway, Power & Light Company to issue \$276,500 of preferred stock and \$1,000,000 of bonds to pay for extensions, betterments and improvements. The bonds are to be sold at 90 or better or pledged at not less than 80.

**Danbury & Bethel Street Railway, Danbury, Conn.**—Judge Lucien F. Burpee in the Superior Court sitting in Danbury has named Attorney J. Moss Ives of that city as temporary receiver of the Danbury & Bethel Street Railway, vice Judge James F. Walsh, Greenwich, whose confirmation was sought. Counsel for different interests were unable to agree upon a receiver, and finally submitted a list of six names to Judge Burpee, who selected J. Moss Ives, one of the more prominent of the Danbury lawyers, for the place. George Tweedy, Danbury, and Frederick Jackson, New Haven, have been named appraisers.

**Massachusetts Electric Companies, Boston, Mass.**—A committee has been formed to protect the interests of holders of preferred shares of the Massachusetts Electric Companies. Robert C. Mores of Jackson & Curtis is chairman. The circular says in part: "On April 1, 1918, \$3,000,000 of notes of the Massachusetts Electric Company will fall due. The principal asset is its interest in stocks of the Bay State Street Railway, a majority of the common stock of which is pledged as security for the notes. We believe these notes will not be paid and probably cannot be renewed in full. This will bring to an acute issue questions affecting the relative positions of the preferred and common shareholder."

COMPARISON OF REVENUES AND EXPENSES OF ELECTRIC RAILWAYS FOR AUGUST, 1917 AND 1916

ACCOUNT	UNITED STATES				EASTERN DISTRICT				SOUTHERN DISTRICT				WESTERN DISTRICT			
	Amount, July, 1917	Per Mile of Line		Increase Over 1916, per Cent	Amount, July, 1917	Per Mile of Line		Increase Over 1916, per Cent	Amount, July, 1917	Per Mile of Line		Increase Over 1916, per Cent	Amount, July, 1917	Per Mile of Line		Increase Over 1916, per Cent
		1917	1916			1917	1916			1917	1916			1917	1916	
Operating revenues.....	\$15,183,651	\$1,937	\$1,789	8.27	\$10,701,600	\$2,021	\$1,872	7.96	\$1,492,854	\$1,557	\$1,376	13.15	\$2,989,197	\$1,888	\$1,759	7.33
Operating expenses.....	9,762,716	1,246	1,111	12.15	6,995,532	1,321	1,173	12.62	864,712	902	803	12.33	1,902,472	1,201	1,091	10.08
Net earnings.....	5,420,935	691	678	1.92	3,706,068	700	699	0.14	628,142	655	573	14.31	1,086,725	687	668	2.84
Operating ratio, per cent.....	1917, 64.33; 1916, 62.10				1917, 65.36; 1916, 62.66				1917, 57.93; 1916, 58.36				1917, 63.61; 1916, 62.02			
Average number of miles of line represented.....	1917, 7,838; 1916, 7,766				1917, 5,295; 1916, 5,257				1917, 959; 1916, 955				1917, 1,584; 1916, 1,554			

COMPANIES REPORTING TAXES

Operating revenues.....	\$9,640,064	\$1,770	\$1,654	7.01	\$5,863,585	\$1,732	\$1,630	6.26	\$813,886	\$1,552	\$1,410	10.07	\$2,962,593	\$1,925	\$1,793	7.36
Operating expenses.....	6,251,629	1,148	1,042	10.17	3,902,437	1,153	1,049	9.91	466,290	889	805	10.43	1,882,902	1,224	1,110	10.27
Net earnings.....	3,388,435	622	612	1.63	1,961,148	579	581	0.34	347,596	663	605	9.59	1,079,691	701	683	2.64
Taxes.....	640,352	118	110	7.27	347,362	103	102	0.98	61,508	117	107	9.35	231,482	150	130	15.38
Operating income.....	2,748,083	504	502	0.40	1,613,786	476	479	0.63	286,088	546	498	9.64	848,209	551	553	0.36
Operating ratio, per cent.....	1917, 64.86; 1916, 63.00				1917, 66.57; 1916, 64.36				1917, 57.28; 1916, 57.09				1917, 63.58; 1916, 61.91			
Average number of miles of line represented.....	1917, 5,448; 1916, 5,381				1917, 3,385; 1916, 3,347				1917, 524; 1916, 524				1917, 1,539; 1916, 1,510			

†Decrease.



**Springfield (Mass.) Street Railway.**—The Springfield Street Railway has passed its dividend for the six months' period ended June 30 last and will pass its dividend for the second six months' period ending Dec. 31. Action on the first period was announced at a recent stockholders' meeting and a definite statement for the second period was made a few days ago. This is the first time that the company has passed its dividend, the lowest rate ever paid heretofore being 6½ per cent. From 1893 to 1910, inclusive, the company paid 8 per cent per annum. The next four years it paid 7 per cent per annum; in the year 1914 to the year ended June 30, 1916, it paid 6½ per cent.

**Toronto (Ont.) Railway.**—William A. Reed & Company, New York, N. Y., have sold \$750,000 of Toronto Railway one-year 6 per cent sinking fund notes. The proceeds of this issue are to be used to retire a similar amount of notes which fall due on Dec. 1. The plan under which the new notes are issued stipulates that the company shall set aside \$50,000 monthly from Feb. 1, 1918, to Dec. 1, 1918, as a sinking fund. This will take care of \$500,000 of the notes at maturity. The new notes were offered at 99, yielding 7 per cent.

**Tri-City Railway & Light Company, Davenport, Iowa.**—John G. Huntoon, general manager of the Tri-City Railway & Light Company, has been elected a director of the company.

**United Light & Railways Company, Grand Rapids, Mich.**—The United Light & Railways Company has authorized a new issue of \$1,500,000 of 6 per cent bond-secured gold notes. The proceeds are to be used to retire \$750,000 of 6 per cent notes due on Jan. 1, 1918, and to take care of additions, extensions and improvements to the company's properties.

**Waycross Street & Suburban Railway, Waycross, Ga.**—Suit is pending in court over the question of dismantling the entire system of the Waycross Street & Suburban Railway, which has suspended operation.

# Traffic and Transportation

## Report on B. C. Electric Railway

Summary Presented of Recommendation of Expert  
Appointed by the Provincial Government

Dr. Adam Shortt, appointed by the provincial government to investigate transportation conditions in Vancouver and Victoria, B. C., following the strike of the trainmen of the British Columbia Electric Railway last June, has filed his report. His investigation included an inquiry as well into the electric light and power system. The report contains 110 typewritten pages. It was made public in Victoria on Nov. 20. Dr. Shortt makes the following recommendations:

### ELECTRIC RAILWAY SYSTEM

Complete elimination of jitney competition in Vancouver and between Vancouver and New Westminster.

Retention of present fares, and transfers within "city population area" to be agreed upon.

Readjustment of fares and service on outside lines at a conference to take place between company and municipal representatives.

Discontinuance of transfers from city to interurban lines and vice versa.

Fair trial of one-man car on certain lines.

Increased speed; skip-stop plan of operation and special through cars to New Westminster.

### LIGHTING SYSTEM

Reduction in lighting rates on Jan. 1, 1918, to 8 cents net; on Jan. 1, 1919, to 7½ cents net; on Jan. 1, 1920, to 7 cents net.

Discontinuance of meter rentals but minimum charge of 50 cents a month.

Payment of 6 per cent interest by the company if security deposits are retained; a surcharge of 10 per cent on all accounts overdue for twenty days, if security deposits are not retained.

### GENERAL

Formation of a public utilities commission for the province.

### FREE COMPETITION MUST CEASE

Dr. Shortt says that the financial condition of the British Columbia Electric Railway as regards its electric railway system is impossible of continuance on the basis of the last three years. Long and wide experience has proved that the urban and interurban electric railway business cannot be continued on a basis of free competition. Jitney competition on a considerable scale has destroyed the normal basis on which the electric railway system of the company was built up and on which it can be maintained. He says that the jitneys in competition with the electric railway must be eliminated. In addition, at least until more prosperous conditions return, certain other changes and economies must be introduced. If the electric railway was to operate on a basis which would compel it to meet jitney competition the railway would at least have to abandon the more unremunerative of its lines, reduce the frequency of service on others, discontinue all transfers and exact a 5-cent minimum fare from all passengers, including children under twelve years, school children, workmen, etc.

The fate of the jitney is regarded as being wrapped up in the report of Dr. Shortt, because the company intimated at the time of the strike and contended during the investigation that its inability to pay the increased wages demanded by the men was due in a large measure to the depletion of its revenue by jitney competition. The company asserted that it could not continue in operation and pay the men their increased wages so long as jitneys took the cream of the business and so long as certain fares and transfer regulations were in force on some of the lines.

## Electric Railway Monthly Earnings

### LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Sept., '17	\$167,622	*\$105,687	\$61,935	\$35,187	\$26,748
1 " " '16	152,529	*89,152	63,377	36,334	27,043
9 " " '17	1,332,785	*891,423	441,362	311,527	129,835
9 " " '16	1,207,012	*753,129	453,883	327,306	126,577

### PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

1m., Sept., '17	\$24,478	*\$18,486	\$5,992	\$7,593	†\$1,601
1 " " '16	26,019	*17,033	8,986	6,128	1,858
12 " " '17	304,292	*229,334	74,958	88,354	†13,396
12 " " '16	309,432	*261,118	108,314	87,345	20,969

### PENSACOLA (FLA.) ELECTRIC COMPANY

1m., Sept., '17	\$31,397	*\$17,491	\$13,906	\$7,803	\$6,103
1 " " '16	23,920	*12,997	10,923	7,712	3,211
12 " " '17	326,874	*189,832	137,042	93,312	43,730
12 " " '16	280,503	*155,104	125,399	90,585	34,814

### PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

1m., Sept., '17	\$805,827	*\$490,110	\$315,717	\$204,211	\$111,496
1 " " '16	690,475	*412,714	277,761	184,760	93,001
12 " " '17	8,953,076	*5,465,562	3,487,514	2,294,644	1,192,870
12 " " '16	7,855,965	*5,013,664	2,842,301	2,206,485	635,816

### RHODE ISLAND COMPANY, PROVIDENCE, R. I.

1m., Sept., '17	\$513,773	*\$440,248	\$73,525	\$121,880	†\$47,173
1 " " '16	515,820	*363,735	152,085	120,714	33,072
9 " " '17	4,549,281	*3,669,960	879,321	1,085,879	†119,743
9 " " '16	4,401,182	*3,126,395	1,274,787	1,041,899	†222,537

### SAVANNAH (GA.) ELECTRIC COMPANY

1m., Sept., '17	\$82,258	*\$57,223	\$25,035	\$24,207	\$828
1 " " '16	70,466	*48,070	22,396	23,570	†1,174
12 " " '17	926,005	*614,589	311,416	288,264	23,152
12 " " '16	802,270	*540,849	261,421	26,422	†19,535

### TAMPA (FLA.) ELECTRIC COMPANY

1m., Sept., '17	\$79,666	*\$46,236	\$33,430	\$5,067	\$28,363
1 " " '16	79,285	*43,303	35,982	4,255	31,727
12 " " '17	1,007,242	*554,845	452,397	53,294	399,103
12 " " '16	966,673	*526,254	440,419	52,217	388,202

### WESTCHESTER STREET RAILROAD, NEW YORK, N. Y.

1m., Sept., '17	\$22,168	*\$22,475	†\$307	\$2,573	†\$2,855
1 " " '16	18,372	*19,805	†1,433	1,865	†3,269
12 " " '17	189,172	*209,024	†19,852	19,443	†39,041
12 " " '16	181,108	*191,447	†10,339	16,102	†26,204

\*Includes taxes. †Deficit. ‡Includes non-operating income.

Dr. Shortt finds that the jitney has no place in the transportation service of a community. That part of his report dealing with this mode of transportation covers more than forty pages of the whole decision. He takes the view that the jitney or the electric car must go. He says finally that "an open-minded examination of the jitney service as it exists at present should convince anyone that while it may be a useful supplement to an electric railway service it cannot possibly take the place of that service."

Dr. Shortt accepts the company's figures of its return on the capital investment. With the elimination of \$3,785,460, which was not used for plant and other public utility property, he finds that the return for the last fiscal year was only 2 per cent. This was not enough to pay debenture interest. In recommending the elimination of the jitney, he points out that the extra income of \$245,000 on city lines would not convert the present deficit into a surplus, but would tend to bring the earnings of the company on its electric railway business to the point of at least meeting its outlay.

AGREEMENT RECOMMENDED ON CITY POPULATION AREA

He also recommends a conference between representatives of Point Grey, South Vancouver and Burnaby and the management of the company "with a view to the recognition of the city population area"—within which fares are to remain as at present—"and the consequent readjustment of fares, transfers and time-tables and any other details which they may mutually agree upon. At such a conference there is no doubt that at least temporary arrangements might be made which would enable the company to continue a reasonable service on practically all of its outlying lines."

Dr. Shortt admits that the intricate and voluminous tabulations on fares which were placed before the commissioner made it impossible, even in a report of 110 pages, to deal with them in detail, but suggests that the rates must be revised and simplified to make them uniform and equitable, referring evidently to the interurban fares. Beyond the limits of a city area to be defined, he states that the suburban areas should bear not the full but some approximate share of the cost of the service rendered. On this point he says: "In practically all cases this will involve the canceling of transfers from urban or interurban lines to city lines—of course, meaning by the city lines those within the city population area to which reference has already been made."

New York Surface Strike Lost  
100,000,000 Passengers

Public Service Commission Has Compiled Traffic Statistics for Last Fiscal Year—Rapid Transit Lines Had Increased Patronage

The surface railway strike in New York City during August and September, 1916, caused a loss in patronage of one hundred million passengers, equivalent to \$5,000,000, according to compilations prepared by A. F. Weber, chief of the Bureau of Statistics and Accounts of the Public Service Commission for the First District of New York. Despite this tremendous loss, traffic generally showed an increase of 20,076,611 for the year ended June 30, 1917, the loss in surface railway traffic being offset by an enormous increase in travel on elevated and subway lines. This increase on rapid transit lines is attributed to two causes—first, to traffic diverted from the surface lines during the strike months, and, second, to new traffic created by the opening of rapid transit lines in several sections of the city.

The total gain shown was the smallest in any one year in the last seventeen years, with the sole exception of 1915, when traffic showed an actual decrease of 5,500,000 in passengers, attributed to the depressed business conditions prevailing in the latter part of 1914. The traffic in the year ended June 30, 1916, showed an increase of 91,102,889, or nearly four and one-half times that of the last year, and this figure was exceeded only by the traffic increases in 1906 and 1910.

In seventeen years passenger traffic has increased in New York City more than one billion. The figures for 1900

show that on the elevated railways and surface railways there were carried 846,353,058 passengers, the first subway not being placed in operation until 1904. In 1917 the total traffic was 1,918,812,226. The following table shows the figures of traffic year by year, together with the annual increases:

Year Ended June 30,	Number of Passengers	Annual Increase
1900.....	846,353,058	
1901.....	881,344,801	34,991,743
1902.....	938,989,964	57,645,163
1903.....	1,000,767,483	61,777,519
1904.....	1,065,984,910	65,217,427
1905.....	1,130,982,696	64,997,786
1906.....	1,251,841,175	120,858,479
1907.....	1,315,381,388	63,540,213
1908.....	1,358,000,407	42,619,019
1909.....	1,402,417,642	44,417,235
1910.....	1,531,262,914	128,845,272
1911.....	1,603,901,397	72,638,483
1912.....	1,680,913,935	77,012,538
1913.....	1,769,876,508	88,962,573
1914.....	1,813,204,356	43,327,848
1915.....	1,807,632,726	*5,571,630
1916.....	1,898,735,615	91,102,889
1917.....	1,918,812,226	20,076,611

\*Decrease.

Study of these statistics in connection with the statistics of population, Mr. Weber says, reveals the fact that electric railway passenger travel increases at a much more rapid rate than population. This is indicated by a table showing the average number of fares paid or rides per capita, as follows:

Year	Fares Per Capita	Year	Fares Per Capita
1860.....	43	1900.....	246
1870.....	103	1905.....	283
1880.....	152	1910.....	321
1890.....	218	1917.....	353

TRAFFIC CHANGES IN LAST YEAR

The largest single item of growth in the last year is represented by traffic in the first subway, operated by the Interborough Rapid Transit Company, with its new extensions. This showed a growth of 42,688,674 for the year, with the Interborough elevated lines next with an increase of 37,133,297. Fully 19,000,000 of the traffic increase in Interborough subways is believed to be new traffic created as a result of opening new lines and extensions. Brooklyn Rapid Transit elevated and subway lines showed an increase, taken collectively, amounting to 19,417,243.

Indication that the surface railway strike of 1916 was largely responsible for the falling off of travel in that year is found in the fact that the surface lines in Brooklyn and Richmond Boroughs, which were practically unaffected by the strike, made substantial traffic gains, that in Brooklyn amounting to nearly 9,500,000 passengers. The largest single decrease in traffic was in the Borough of Manhattan, totaling 77,585,733; the Bronx being next, with 13,287,710, and Queens (exclusive of Brooklyn Rapid Transit lines) being third, with a decrease of 3,260,722. The following comparative summary gives the statistics of travel for the years ended June 30, 1916 and 1917:

	Revenue Passengers Carried		Year's Increase	
	1916	1917	1916	1917
<b>Elevated and Subway Lines:</b>				
Interborough elevated lines.....	312,246,796	349,380,093	10,454,279	37,133,297
Interborough subway lines.....	371,505,318	414,193,992	25,919,569	42,688,674
B. R. T. elevated and subway lines.....	207,098,269	226,515,512	24,562,372	19,417,243
Hudson and Manhattan tubes.....	62,293,534	68,556,999	4,327,120	5,263,405
<b>Total .....</b>	<b>954,143,917</b>	<b>1,058,646,596</b>	<b>65,263,340</b>	<b>104,502,679</b>
<b>Surface Railways:</b>				
Borough of Manhattan .....	427,373,947	349,788,114	11,822,731	*77,585,733
Borough of The Bronx .....	84,535,737	71,153,027	3,032,934	*13,382,710
Borough of Brooklyn .....	363,630,177	373,079,651	8,930,064	9,449,474
Borough of Queens (exclusive B.R.T.) .....	54,167,403	50,906,681	1,481,295	*3,260,722
Borough of Richmond .....	14,884,534	15,238,157	572,525	353,623
<b>Total .....</b>	<b>944,591,698</b>	<b>860,165,630</b>	<b>25,839,549</b>	<b>*84,426,068</b>
<b>Grand total.....</b>	<b>1,898,735,615</b>	<b>1,918,812,226</b>	<b>91,102,889</b>	<b>20,076,611</b>

\*Decrease.

## San Francisco Trans-Bay Rate Case

Cost of Operating and Plans for Improving Key Route System Announced—Discussion on Consolidation with Southern Pacific and on Purchase by Municipalities

Hearings on the application of the Southern Pacific Company and the San Francisco-Oakland Terminal Railways for fare changes were resumed by the State Railroad Commission of California on Nov. 12. The Southern Pacific Company informed the commission of the specific rates it desired to establish, both by its direct passenger routes through Oakland and Alameda piers, and by way of the Creek route. The company desires to graduate the rates according to distance. For example: The one-way fare between San Francisco and Seminary Avenue, Oakland, is 10 cents, with a commutation fare of \$3, the distance being 12 miles. It is proposed to increase the rates, beginning at West Oakland, to which point it is desired to increase the one-way fare of 10 cents to 15 cents and the \$3 commutation rate to \$3.45, while the one-way fare to Seminary Avenue would be increased from 10 cents to 35 cents and the commutation fare from \$3 to \$5.50.

No specific figures were set forth by the San Francisco-Oakland Terminal Railways, but it asked that its trans-bay fares, both one-way and commutation, be increased. This company also sought authority to increase the interurban fares of its street railway system between points in Alameda County and between points in Alameda and Contra Costa Counties over what is known as the traction division.

### ELIMINATION OF COMPETITION SUGGESTED

Opponents of the rate increase claimed that there is now an unnecessary duplication of service and that for rate-fixing purposes the Southern Pacific Company and the San Francisco-Oakland Terminal Railways together are entitled only to such return as would be permitted under a theoretical combination of existing facilities to give the same service as at present. Suggestion was made that one system could be constructed out of the present facilities of the two companies, which would entirely eliminate unprofitable competition and duplication of facilities, retain all the present gross revenue, reduce operating expenses and overhead and afford an adequate return upon the necessary investment. President Thelen of the commission requested C. W. Durbrow of the Southern Pacific, H. L. Creed of the Key Route and B. D. Marx Greene, representing Berkeley and Alameda, to confer with their principals as to whether they will abide by the decisions of the commission in regard to the removal of unnecessary tracks.

Additional capital of more than \$3,000,000 will be required in the next five years by the San Francisco-Oakland Terminal Railways, according to testimony of W. R. Alberger, vice-president and general manager. The figure is made up of the following estimates:

Track construction.....	\$1,390,416
Second track on existing lines.....	170,212
New track including a downtown loop.....	250,000
New lines in districts now developing.....	181,600
New equipment including eighty modern street cars...	891,000
Miscellaneous new construction.....	155,000
Total.....	\$3,038,228

### JITNEYS AND BUSES DECREASE TRAFFIC

Decreased revenue traceable to jitneys for the year and a half ending with 1916 amounted to \$750,000, and the buses are now costing the company more than \$100 per day, Mr. Alberger stated. Because of the reduction in the number of working hours from 360 to 240 a month, the company has found it necessary to add two full boat crews. Wages of ferry boat employees have increased \$41,850 a year. Mr. Alberger stated that the Key Route loss and damage account is 0.01812 per cent of the gross earning, while that of seventeen other Pacific Coast railway companies is 0.0313 per cent of their combined gross earnings. Construction costs per mile of single track with paving have steadily increased, according to Mr. Alberger's testimony. The cost for materials in 1912 was \$19,639; in 1914, \$24,595; in 1915, \$26,630, and 1917, \$30,752. A working capital of \$50,000 is required for the Key Division, and \$250,000 for the Trac-

tion Division, which money must be secured from stockholders or borrowed from banks. Mr. Alberger also testified that the resettlement franchise upon which a joint committee of nineteen, representing the municipalities affected and the traction company, would be ready before Feb. 1, and would be a model franchise when completed.

W. R. Scott, vice-president and general manager of the Southern Pacific, classified his corporation as an eleemosynary institution. He stated at the hearing that his company invested approximately \$10,000,000 in electrifying lines in Oakland, Berkeley and Alameda from philanthropic motives. J. C. McPherson, superintendent of suburban traffic for the Southern Pacific, stated that the company operates 700 suburban trains a day out of the Oakland mole and 300 out of the Alameda mole. His estimated figures for passengers handled a year were 18,000,000 to 19,000,000 by the Southern Pacific and 15,000,000 by the Key Route.

### HEARING GOES OVER UNTIL 1918

On Nov. 18 the hearing was adjourned until Jan. 24. This date was fixed by the commission to allow two months for the completion of the reports of its expert engineers investigating values, and one week for interested parties to examine these reports.

## Another Indiana Line Seeks Increase

Indianapolis & Cincinnati Traction Company Wants to Change Fare Basis from Two to Two and One-Half Cents a Mile

The Indianapolis & Cincinnati Traction Company on Nov. 21 filed with the Public Service Commission of Indiana a petition asking authority to increase passenger fare rates on its lines, from a basis of 2 cents a mile to a basis of 2½ cents a mile. According to the petition the exigencies of the war have made it impossible for the company to operate on its present basis with an adequate return. The company says that the returns from the proposed increases will only take care of increases in operating expenses and the fixed charges of the company, leaving nothing for dividends to stockholders. When he filed the petition, Charles L. Henry, president of the road, issued a statement in which he said:

### PRESIDENT HENRY EXPLAINS

"The petition just filed by this company with the Public Service Commission asks authority to increase its interurban fares on all of its lines from a basis of 2 cents a mile to a basis of 2½ cents a mile; allowing a reduction of 5 per cent on round-trip tickets; fixing the sale of mileage books at a basis of 2 cents a mile and the sale of commutation books at twenty-five times the new one-way fare for forty trips within a month and thirty times the new one-way fare for sixty trips within a month.

"The petition asks relief from the financial difficulties it is encountering on account of the increased cost of maintenance and operation growing out of the war conditions. The increase which it asks amounts on paper to 25 per cent, but the company does not expect to realize that much actual increase in money. In fact, it estimates that it will realize an increase of only 12½ per cent in money.

### DEFICIT FOR LAST THREE YEARS

"The company, in its operation, has shown a deficit for the last three years and will show a deficit for the present year; that is, it has not received from operation of the road enough money to pay operating expenses and the fixed charges against the road, namely, taxes, interest on bonds, etc., without taking into consideration in any way any return on the capital stock of the company.

"No dividend has been paid on any of the capital stock since the organization of the company except the following small dividends on the preferred stock: April 1, 1911, one-half of 1 per cent; Oct. 1, 1911, 1¼ per cent; Oct. 1, 1912, 1 per cent. The petition sets forth the necessity for the increase of fares which is occasioned by the very high increase in material and labor, the largest single item being that of coal. It shows that the company will be compelled to pay for coal in 1918 \$37,130 more than during the year 1917."

## Fare Increase in Meridian

### One-Cent Charge for Transfers and Abolition of Tickets Expected to Help Meet Increased Operating Costs

A higher schedule of fares has been put into operation by the Meridian Light & Railway Company, Meridian, Miss., on its railway lines. This readjustment in fares has taken the form of reducing the number of tickets sold at a flat price and instituting a charge for transfers.

#### TWENTY-FOUR RIDES FOR ONE DOLLAR ABOLISHED

The readjustment in regard to the price of tickets started out with the abolition of twenty-four rides for \$1. No tickets for ordinary use are now being sold at a discount. The school ticket, however, has been retained, but at a greater rate per ride. Originally school tickets sold at 2½ cents each, in books of forty for \$1. Under the new schedule, thirty tickets are being sold for \$1. This increases the price per ticket to 3 1/3 cents.

These increases have been put into effect after explaining to the public that they were absolutely essential because of the greatly increased costs of operation. After the ticket fare schedule had been changed, a 1-cent charge for transfers was instituted. Before the transfer charge went into effect the following announcement was run as an advertisement in the Meridian newspapers:

#### THE NEWSPAPER ANNOUNCEMENT

"During the past few months several articles have appeared in this paper giving you facts regarding the increased cost of street car rides.

"It is our desire to render at all times the best of service at a fair price.

"We realize that our company, like others, is absolutely dependent for its success upon the good service given, as well as on the good-will of the public served.

"As we have enumerated in previous articles, everything entering into the cost of the street car ride has mounted so rapidly that we are unable to meet these increased costs without asking your assistance. We are, therefore, forced to announce to our patrons that beginning Oct. 29 it will be necessary for us to make a charge of 1 cent for each transfer issued.

"While this charge will give us a small amount of relief, it will in no way offset the enormous increases in the cost of all materials and wages which go to make up the street car ride. We, therefore, ask the indulgence of our patrons for the necessity of making this nominal charge until at least conditions again become normal."

H. E. Brandli, general manager of the company, estimates that the charge for transfers will mean an addition of between \$225 and \$250 a month to net revenue. Discontinuing the sale of twenty-four rides for \$1 is expected to add \$125 to the monthly net revenue. According to Mr. Brandli's estimates, this makes a total increase of \$375 a month to Meridian's net income.

## Jitney Bond Law Sustained

In reaffirmation of two previous decisions sustaining the jitney bond law, the State Supreme Court in Seattle, Wash., has refused to grant Earl Hatfield and 197 other jitney drivers in Seattle an injunction to prevent Alfred H. Lundin, prosecuting attorney for King County, from enforcing the permit law against operators of jitneys in Seattle. To do so, the court holds, would be to amend the act of 1915, under the guise of construing it.

The jitney men claim that they are unable to procure the required bond, after the failure of the company that first indemnified jitneys, unless the Secretary of State is compelled to accept the bond of the Mutual Union Insurance Company, organized by jitney men of Seattle. This company was refused authority to write surety bonds on the amount of security it was able to furnish to the State insurance commissioner. Subsequently the Supreme Court sustained the insurance commissioner in the stand he took. The court declares that if the jitney men cannot procure the kind of bond defined by the statute, they are not entitled to street privileges.

## Commission Overruled in Fare Case

### Circuit Court of South Carolina Overrules State Railroad Commission

Circuit Judge James W. Devore, at Columbia, S. C., has overruled the State Railroad Commission and granted the petition of the Augusta-Aiken Railway & Electric Corporation for an increase in passenger rates to 2 cents per mile. The case will go to the Supreme Court. This company operates an electric railway between Aiken and Augusta. The distance is 23.77 miles. The present passenger fare for the trip is 25 cents. The company wanted to increase this to 2 cents a mile, or about double the existing tariff. This increase the State Railroad Commission refused to permit. The case has been in the courts in one form or another for several years.

Claud N. Sapp, assistant attorney general, representing the Railroad Commission, has served notice of intention to appeal to the Supreme Court.

Judge Devore in his decree discusses the case at length. His ruling in part is as follows:

#### WHAT THE JUDGE SAID

"There is an estimate made by the railroad, and rebutted in no way by the record, which shows that if the rates are increased to approximately 2 cents per mile the net return on the investment will be 3 per cent a year. To deny persons who have invested in this enterprise a return on their money of 3 per cent a year would, in the judgment of the court, continue the case within that sphere in which the court must act and give relief. There is nothing in the record to show that the railroad is extravagant and that proper skill is not exercised in operating it. The Railroad Commission should not only have granted some increase of passenger rates, but should have granted rates asked for in the petition to it.

"How these passenger rates are to be applied is for the Railroad Commission to decide. That body approved a schedule filed by the railroad at one phase of the long-drawn out proceedings, and can with equal facility consider the same or some other plan that may seem proper to it. Upon this point the court will not touch.

"The prayer of the petition herein is therefore granted and the record is returned to the Railroad Commission with the direction that the prayer of the corporation for an increase to approximately 2 cents a mile be granted under such rules, regulations, zones or other details as the Railroad Commission may decide upon."

## Cleveland Fares Discussed

### Officers of City Concerned Over Seeming Need for an Advance in the Rate of Fare

Mayor Harry L. Davis of Cleveland, Ohio, has announced his intention of preserving, if possible, the present rate on the Cleveland Railway although indications point to the necessity of an advance on Jan. 1. Councilman J. W. Reynolds, chairman of the street railway committee, has asked the company for a statement of the condition of the interest fund.

In an address before the Cleveland Real Estate Board on Nov. 21 Peter Witt, former street railway commissioner, declared that the 3-cent fare had been maintained by the present administration by crippling the service. He said that if the administration had continued to buy cars and maintain service at the standard set when he left office, the maximum rate of fare would be in effect now.

Mr. Witt expressed approval of subway terminals, but opposed the suggestion that the Cleveland Railway pay rent for their use. He said that the establishment of the zone system for the preservation of low fare was at hand. He expected to see Cleveland take the lead in this movement.

Fielder Sanders, street railway commissioner, said that the highest rate of fare provided in the Taylor franchise was seven tickets for a quarter and that a 5-cent rate would never be possible. There were four separate fare levels higher than the present charge. The rate within the city of Lakewood was 3 cents and the franchise granted a year ago provided that the fare remain at 3 cents until 1934.

## Suggestions Sought from Public

The management of the Trenton & Mercer County Traction Corporation, Trenton, N. J., wants to improve its service with the aid of the general public. Rankin Johnson, president of the company, has inserted the following advertisement in the newspapers:

"We are striving to give Trenton a good electric railway service. We ask your help. We want constructive criticism. If your service is poor and you know why, tell us why. Be specific, not general. For instance, don't say, 'Your cars are dirty.' If you see a car with a dirty floor or windows, tell us. Give the number of the car. Your suggestions will receive prompt attention and serious consideration. Your cars may not run on time. If so, tell us. We want to know it. If it is the company's fault we can eliminate the cause. If it is due to something over which we have no control, maybe you can help us to remedy matters. This company is poor. We haven't paid a cent of dividends. We hope eventually to prosper, but we realize we cannot prosper unless we give good service—unless you know your service is as good as that of any other city of Trenton's size. There are many problems confronting the company about which the people of Trenton should know. We are going to tell you about them through little leaflets we shall distribute in our cars. Help us with your suggestions."

The company hung in its cars a poster over the signature of Rankin Johnson, president, asking for suggestions. This poster was worded as follows:

"We ask your help. If there is anything about our service you don't like, please tell us. Make it specific. We want all the constructive criticism we can get."

## Heat and Service Reduced in Pittsburgh

It was reported from Pittsburgh on Nov. 26 that, acting under instructions received from the War Priorities Board, the Pittsburgh Railways was reducing its traffic facilities during dull hours of the day by 20 per cent and that it would cease providing heat in cars during the six rush hours of the day unless a stiff protest made by the City Council results in the Washington board changing its attitude.

## Another Pacific Coast Fare Request

Marshall E. Sampsell, Chicago, Ill., president of the Seattle & Rainier Valley Railway, operating in Seattle, formerly known as the Seattle, Renton & Southern line, will appear before the Seattle City Council and ask for the abolition of the 4-cent fare and the fixing of a charge of 2 cents for transfers to other lines, to care for the increasing operating costs and to meet the new wage scale of the men. If the Council refuses to grant this petition, the company will appeal to the State Public Service Commission for relief. Mr. Sampsell is in Seattle on his annual tour of inspection. He said:

"If the 4-cent tickets were abolished and a charge of 2 cents made for transfers it would bring the company additional revenue of between \$36,000 and \$40,000 a year. This sum would be entirely absorbed by increased operating costs, depreciation and the new wage scale."

The wage scale of the Seattle & Rainier Valley Railway was fixed automatically by the arbitration board which set the scale recently for the Stone & Webster men in Seattle and Tacoma. During the strike in Seattle employees of the Seattle & Rainier Valley Railway remained at their posts with the understanding that they were to share with the Stone & Webster employees any benefits of the strike. The new wage scale, according to Mr. Sampsell, will increase the payroll of the Seattle & Rainier Valley Railway between \$7,000 and \$8,000 annually.

**New York City Fare Hearings Postponed.**—The hearing on the applications of the Third Avenue Railway and other

metropolitan companies for permission to charge higher rates has been postponed from Nov. 26 to Dec. 10. Adjournment for one week was taken at the request of the companies, and this was extended another week on motion of the commission. The two vacancies in the commission, it was said, will probably be filled by then.

**One-Man Request Withdrawn.**—By an agreement of all parties concerned and at the request of Governor M. Alexander of Idaho, the applications of the Boise Valley Traction Company and the Boise Railroad to the Public Utilities Commission for permission to install one-man crews on all of the cars operated over their city and interurban lines, have been withdrawn. Governor Alexander was warned that a strike might follow if the roads persisted in their request, and he urged the companies to avoid industrial disturbances and withdraw their applications.

**Traffic Matters Before Detroit City Commission.**—The Common Council of Detroit, Mich., has adopted a resolution presented by the public utilities committee in which all matters concerning electric railway service—skip stops, extensions, etc.—are referred to the City Street Railway Commission for consideration. Included in the matters referred were several resolutions pertaining to skip-stop operation as well as a resolution providing for an extension of the Grand Belt Line out Mount Elliott Avenue to the Lynch Road to give service to new munition plants.

**Fare Increase Rumors in Louisville.**—That the Louisville (Ky.) Railway will shortly apply to the city administration of Louisville for acquiescence in a plan to make a charge of 1 cent for all transfers issued to passengers on the company's lines is a current report in Louisville. T. J. Minary, president, and other officials of the company declined to discuss it, except to say that the report was premature as the company's directors have no plan before them at this time. Mr. Minary, however, stated that it was essential that the company find some means of increasing its revenue if it were going to continue to operate profitably.

**Increase in Fare on Fort Smith Suburban Line.**—Because the operation of the line at a 5-cent fare rate has been accompanied by financial loss to the Fort Smith Light & Traction Company, and because of the further fact that the shutting down of the Fort Smith Smelter Company's plant will reduce the traffic, the company has increased the fare on the South Fort Smith line to 10 cents. D. C. Green, vice-president and general manager of the company, in making the announcement of the higher rate of fare, explained that the company put the 5-cent fare into effect with much doubt, at the earnest solicitation of property owners and the managements of industrial plants in that section.

**Safety Zones for Dallas.**—Safety zones on downtown streets for patrons of the electric railways will be recommended by N. M. Baker, supervisor of public utilities of Dallas, Tex. The matter will be placed before the Dallas Railway and the city commissioners in an effort to reach an agreement. Under the plan as outlined, a zone extending 3 ft. from the tracks at all corners where cars stop to discharge or take on passengers will be marked off with iron railings or blocks placed in the pavement to prevent automobiles from running down people waiting for cars. This will make unnecessary the present city ordinance requiring automobiles to come to a full stop back of electric railway cars discharging or taking on passengers.

**Abandonment Petition Renewed.**—The Dunkirk (N. Y.) Street Railway, which is controlled by the Buffalo & Lake Erie Traction Company, has renewed its application before the Public Service Commission for the Second District of New York for permission to abandon its belt line service in Dunkirk. The company in its notice states that it has further evidence to offer. A hearing on the company's original application was heard in Dunkirk on Aug. 9 before Public Service Commissioner Barhite. As a result of the hearing the application was denied and the company, which had ceased operating its belt line cars for a time, was compelled to renew service. By the provisions of the order in the original case, reviewed in the *ELECTRIC RAILWAY JOURNAL* of Sept. 15, page 452, the right was reserved to the company to offer further or different proof as to the necessity of the abandonment.

**Rush-Hour Problems in New York.**—The Interborough Rapid Transit Company, New York, N. Y., has issued a pamphlet giving a "close-up" view of the subway rush hour. Every twenty-four hours the subway carries more than 1,350,000 passengers, 900,000 of whom ride between the hours of 6 and 9 a. m. and 4 and 7 p. m. It is pointed out for the benefit of the public that the trainmaster finds it necessary in running the system to make a constant study of the business habits of the people of New York. He must know approximately how many passengers to expect at each station in the morning rush and at what time. The actual work of getting the rush-hour trains under way starts about 5.30. A reproduction is made in the pamphlet of a card posted in the subway cars which states that in the year just ended the Interborough carried safely 763,574,085 passengers, 79,821,971 more than a year ago.

**Coal Movement Helped by the I. T. S.**—The Mayors of Danville, Champaign and Urbana, Ill., have given the Illinois Traction System permission to move coal through the streets of those cities at other hours and in larger sized trains than those prescribed in the various franchises held by the company. Under the franchises only eighteen cars of coal a day could be moved through Champaign and Urbana, but by eliminating the provisions which restricted transportation of coal through the streets of those cities to the hours between 11 p. m. and 5 a. m. the company is able to increase its coal delivering capacity to thirty cars a day for Champaign and Urbana alone. Danville had also imposed heavy restrictions inasmuch as not more than two cars of coal, or two freight cars of any description could be transported through the streets in one train at any hour. The period of free movement of coal cars is for the duration of war. The change was brought about by action of the local committee on fuel administration in Danville and Champaign-Urbana.

**Metal Tickets Adopted in Kansas City.**—Metal tickets of full fare and half-fare denominations will be placed in service by the Kansas City (Mo.) Railways on Dec. 1 to displace the present paper tickets. The first shipment calls for 25,000 full-fare and 15,000 half-fare tickets. The full-fare tickets have a 5-cent value, while the half-fare tickets for use by children have a 2½-cent value. A special use for the half-fare ticket also will develop in connection with the Independence (Mo.) Line. The plan here will be for the passenger to pay a 5-cent fare on boarding the car, and upon reaching the end of the 5-cent zone the conductor will collect another 5 cents and give the passenger a 2½-cent metal ticket in return. On the return trip the passenger will pay a 5-cent fare and turn back the half-fare metal ticket, making the round-trip rate 15 cents. The two classes of tickets to be used will be differentiated both by the size and the legend. The full-fare ticket will have the name of the company, "K. C. Rys. Co.", in raised letters on the bar across the middle of the ticket, and with "full" and "fare" printed on the rim above and below the cross bar. The half-fare ticket has the fraction "½" in large numerals reading vertically down the center bar, with "K. C. Rys. Co." around the rim at the top and "fare" on the rim at the bottom.

## New Publication

**Unified Accounting Methods for Industrials.** By Clinton E. Woods. The Ronald Press Company, 20 Vesey Street, New York, N. Y. 550 pages. Half leather, \$5.

Although this book deals with methods of accounting for manufacturing enterprises, it portrays a unified accounting system that should interest any electric railway accountant who desires to keep his mind in touch with the important developments in his profession. The comprehensive plan for developing the detailed figures of production, sales and finances shows how it is possible for the accountant to measure the efficiency of results in the whole business. The description should inspire the reader to a better appreciation of the accountant's important part in modern business. Moreover, the particular methods advocated would without doubt give valuable suggestions along purchasing, stores, shop and other lines.

## Personal Mention

**R. B. Kook** has been appointed general manager of the American Traction Company, International Falls, Minn., a new position with the company.

**K. E. N. Cole**, who has been connected with the general offices of the Fort Smith Light & Traction Company, Fort Smith, Ark., has assumed the management of the Van Buren branch of the company.

**G. B. Davis**, who has been manager of the Van Buren branch of the Fort Smith Light & Traction Company, Fort Smith, Ark., will continue as superintendent of the Crawford County business of the company.

**H. F. Ewing**, superintendent of construction of the United Railroads, San Francisco, Cal., has been called to the army as captain in the Quartermaster's Corps and assigned to the ambulance section of sanitary trains, Camp Travis, Tex.

**J. F. Strickland**, Dallas, Tex., president of the Texas Electric Railway, the Dallas Railway, the Dallas Electric Light & Power Company and interested in other utility properties in Texas, has been elected Reigning Jupiter of the Jovian Order.

**J. H. Pardee**, president, and **J. P. Ripley**, railway engineer, The J. G. White Management Corporation, New York, N. Y., are visiting the Philippine Islands, making a general inspection of the Manila Electric Railroad & Light Corporation and other interests in the islands operated by the Management Corporation. They are expected to return to New York City about Jan. 15.

**C. A. Goodnow**, vice-president of the Chicago, Milwaukee & St. Paul Railway, who superintended the electrification of the railway between Avery, Idaho, and Harlowton, Mont., has arrived in Seattle, and will superintend the work of electrifying the line from Othello to Seattle. The contracts for locomotives and substation equipment for this branch were referred to at length in the *ELECTRIC RAILWAY JOURNAL* of Nov. 3, page 819.

**Parker H. Kemble**, formerly chief of the drafting department, motive power and machinery bureau, of the Boston (Mass.) Elevated Railway, and recently engaged in engineering work for utilities in New York, Toronto and Cincinnati, has entered the Sea Service Bureau of the United States Shipping Board for the duration of the war. Mr. Kemble has lately been engaged in aeroplane photography and special studies of navigation conditions for the government, and has taken special interest in the naval side of the war, besides having taken the Plattsburg course in 1916.

**Oscar T. Crosby**, assistant secretary of the treasury, it was announced in a dispatch from Paris on Nov. 26, will represent the United States at a meeting of representatives of all the Allies to be held in London soon to discuss the present economic and industrial situation. Mr. Crosby has been assistant secretary of the treasury since early in the present year, when he was nominated for appointment to that post by President Wilson. He was formerly resident manager in Belgium of the work of the American Commission for the Relief in Belgium and northern France. He is well known as a publicist, explorer, engineer and electric railway executive.

**F. C. Potvin**, for the last year secretary of the Northern Ohio Traction & Light Company, Akron, Ohio, resigned that office and left the service of the company on Nov. 8. He will engage in the drug business in Detroit. Mr. Potvin had been connected with the properties controlled by Hodenpyl, Hardy & Company, New York, N. Y., for about sixteen years. He started as a gas fitter with the Detroit Gas Company and after some years in the mechanical departments was promoted to the accounting department of a Michigan company. He served in this department in a number of places and prior to becoming secretary of the Northern Ohio Traction & Light Company was secretary of the Michigan Light Company, Jackson, Mich.

Leonard S. Cairns, assistant general manager of the Manila Electric Railroad & Light Company, Manila, P. I., has been appointed general manager of the Eastern Pennsylvania Railways, Pottsville, Pa., by The J. G. White Management Corporation, New York City, the operating managers of both companies. Mr. Cairns has arrived in the United States and has assumed the duties of his new position. He succeeds L. H. Palmer, who lately became assistant to the president of the United Railways & Electric Company, Baltimore, Md., as recently announced in these columns. Upon leaving high school Mr. Cairns entered the employ of the Twin City Rapid Transit Company, Minneapolis, Minn., and, after several promotions, was made general superintendent of that company. In 1912 he was employed by The J. G. White Management Corporation to fill the position of assistant general manager of the Manila Electric Railroad & Light Corporation.

W. E. Titus has been appointed superintendent of the Easton (Pa.) Transit Company. Mr. Titus began his career in 1903 as conductor for the Middlesex & Somerset Traction Company, New Brunswick, N. J., where he remained for about a year, when he was made night receiver for the company. In October, 1905, he was appointed motorman for the Trenton & New Brunswick Railroad, operating a high-speed electric service between Trenton and New Brunswick, N. J. He served in this capacity for about five years. He was then appointed superintendent for the receivers of the Trenton & New Brunswick Railroad in charge of all departments, including the power station. During this period the entire property was rehabilitated. For the last four years Mr. Titus has served as assistant superintendent of the Public Service Railway, Newark, N. J., in charge of the "Fast Line" operating between Newark and Trenton and between Newark and Perth Amboy.

H. M. Bylesby of H. M. Bylesby & Company, Chicago, Ill., operators of the Northern States Power Company and other utilities, at the request of the War Department, has accepted a commission as major in the aviation department of the United States Signal Corps. He will be executive officer of the personnel section in charge of recruiting the large number of flyers and mechanics needed for aviation service. His headquarters will be in Washington, but as his duties will require traveling he expects to visit Chicago frequently. As an organizer and presiding officer of patriotic meetings in Chicago, as a speaker in the Liberty Loan campaigns in Illinois and Wisconsin, and as a member of the executive committee of the Chicago Chapter of the Red Cross, Mr. Bylesby's patriotic efforts are well known. He is also chairman of the Chicago branch of the National Security League; member of the executive committee and one of the organizers of the Universal Military Training League; chairman of the allied committee for recruiting in Chicago; a member of a committee of the National Defense Council, and an active worker for the Navy League.

W. M. Irwin has been appointed superintendent of overhead lines and signals, of the Chicago, Ottawa & Peoria Railway, Ottawa, Ill. Mr. Irwin has served as general line foreman for the company under W. F. Carr, resigned, for the last seven years. His early experience in the electrical field was with the Graves & Hayer Telephone Company, then an independent system, and now a part of the Central Union Telephone Company. Later Mr. Irwin served as a lineman for the Chicago Telephone Company, the Cincinnati Bell Telephone Company, and the Kenlock Telephone Company at Mobile. Subsequently he was foreman for the Central Union Telephone Company at Indianapolis, the Kenlock Telephone Company at Paris, Ill., and the American Telephone & Telegraph Company in Michigan. He was also employed for a period by the Indiana Union Traction company at Anderson and Marion as a lineman. He was responsible for the building of the concrete pole transmission line from Morris to Ottawa, Ill., one of the first experimental lines in the State. Thereafter he became district manager for the Farmers' & Merchants' Telephone Company at Sheridan, Ill., with ten local exchanges under his direction. He became connected with the Chicago, Ottawa & Peoria Railway in 1910 as foreman on the Seneca-Morris extension, and later was promoted to the position of general line foreman, which he held until his recent advancement.

Eugene C. Clarke has resigned as supervisor of instruction for the Brooklyn (N. Y.) Rapid Transit Company to accept a position with the Tacoma Railway & Power Company, Tacoma, Wash., to direct the instruction of the trainmen and to handle general efficiency work. Mr. Clarke leaves Brooklyn after thirteen years of continuous service. His first employment there was in the shops of the elevated division after which he entered the transportation department, assuming successively the titles of electrical inspector of elevated lines, assistant chief instructor of surface lines, supervisor of motormen on the surface lines and finally supervisor of instruction. Mr. Clarke's activities, however, were



E. C. CLARKE

much broader than these titles indicate, particularly in the advancement of safety-first work. He was one of the electric railway pioneers in this field, among his achievements being the first moving picture, "The Price of Thoughtlessness," in co-operation with a large film company, and a series of striking posters and car cards and stereoptical slides in co-operation with a prominent newspaper artist. Mr. Clarke's ability as an instructor has been so widely recognized that his services have been borrowed on several occasions by other electric railways who wished to make their motormen more efficient. Mr. Clarke is a native of Atlanta, Ga., where he received his school training and early technical education. On coming to New York his first employment was in the shops of the Interborough Rapid Transit Company and on the electrification of the Long Island Railroad.

Slaughter W. Huff, who has been vice-president of the Brooklyn (N. Y.) Rapid Transit Company and other companies in the Brooklyn Rapid Transit System since January,



S. W. HUFF

1914, was elected president of the Third Avenue Railway, New York, N. Y., on Nov. 27 to succeed Edward A. Maher, Sr., who tendered his resignation last August to take effect on Dec. 31. Mr. Huff was born in Virginia and was graduated from the electrical engineering course at Cornell University. He entered the electric railway field when it was practically in its infancy. His first experience was obtained in the shops of the Union Railway, Richmond, Va., at the time that Frank Sprague turned over his work to the local company. Subsequently Mr. Huff became general manager of the Raleigh (N. C.) Street Railway. He has been associated in various capacities with the Baxter Electric Railway & Power Company, Baltimore; United Railways & Electric Company, Baltimore; United Railroads, San Francisco, and the Virginia Passenger & Power Company, Richmond, Va. He resigned as general manager of the last-named company in 1908 to become president of the Coney Island & Brooklyn Railroad, the controlling interest in the stock of which was taken over by the Coney Island & Brooklyn Railway, a subsidiary of the Brooklyn Rapid Transit Company. Mr. Huff became identified with the Coney Island & Brooklyn Railroad following a change in ownership and during his connection with the property the system was very largely reconstructed and modernized. He succeeded the late John F. Calderwood as vice-president of the Brooklyn Rapid Transit Company.

Charles R. Lahr has been elected secretary of the Northern Ohio Traction & Light Company, Akron, Ohio, succeeding F. C. Potvin, resigned. Mr. Lahr is the only person now connected with the Akron company who has been continuously in the service for more than twenty-five years. At the time he began work for the old Akron Street Railway in 1892, he was the only office employee engaged. His title was cashier and he also kept the books and looked after all of the office work. In 1897 the Akron Street Railway and the Akron Electric Light Company were consolidated under the name of the Akron Street Railway & Illuminating Company, and Mr. Lahr served in the capacity of



C. R. LAHR

cashier and bookkeeper. In 1899 this company went into the hands of a receiver, under whom Mr. Lahr served in the same capacity. In 1901 the Everett-Moore syndicate purchased the property at receiver's sale, retaining Mr. Lahr in his old position. In 1906 the company purchased the Cuyahoga Falls Rapid Transit Company, merged it with the Northern Ohio, and reincorporated as the Northern Ohio Traction & Light Company. At this time Mr. Lahr was appointed auditor of the company, which office he retained until elected secretary. In December, 1916, the property passed into the control of Hodenpyl, Hardy & Company, New York, who are now operating it. One hundred and fifty people are now employed in the department in which Mr. Lahr began as the only employee. Mr. Lahr was born on April 13, 1873, and lived on a farm until he was nineteen years of age. His connection with the Akron Street Railway Company was his first "city" job.

James Sweeney has been appointed auditor of the Northern Ohio Traction & Light Company, Akron, Ohio, succeeding Charles H. Lahr, promoted to the office of secretary. Mr. Sweeney began his business career as a clerk in the accounting department of the company eleven years ago and for the last five years has been chief accountant. George Wherley succeeds him in the latter position.

## Obituary

Amos S. Crane, general traffic manager of the Boston & Maine Railroad and a director of the Conway (Mass.) Electric Railway, died at his residence in Weston, Mass., on Nov. 22.

Edward Rathbone Bacon, interested in tramway development in Europe in the latter part of the last century, died suddenly at his home in New York on Nov. 14 at the age of seventy-six years. Mr. Bacon was at one time president of the Cincinnati, Washington & Baltimore Railroad and later vice-president of the Baltimore & Ohio Southwestern Railway. He was also at one time a director of the Interborough Rapid Transit Company, New York, N. Y.

Clinton White, who retired in 1915 from membership in the Massachusetts Public Service Commission, died at his residence in Melrose, Mass., on Nov. 24. Mr. White was a native of Charlestown, Mass., and for many years was engaged in the lumber and teaming business. In 1897 he was appointed to the Massachusetts Harbor & Land Commission, where he served four years, leaving that post at the request of former Governor W. Murray Crane to become a member of the Massachusetts Railroad Commission. Here he served with great ability until his retirement on account of age from the successor to this board. Mr. White was specially noted for his grasp of finance, and was highly regarded by representatives of the press and especially by technical journalists who had occasion to call upon him for information or advice. He was at one time vice-president of the Charlestown Savings Bank. Mr. White was in his seventy-third year.

## Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (\*) indicates a project not previously reported.

### RECENT INCORPORATION

\*Montgomery Transit & Light Company, Wilmington, Del.—Incorporated to construct and operate electric railways and light plants. Capital stock, \$1,000,000. K. E. Longfield, Wilmington, is one of the incorporators.

### FRANCHISES

Cincinnati, Ohio.—A new franchise is being considered by the City Council of Cincinnati for the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad. Under the new franchise the company will abandon the old route on the Lower River Road at a point 3 miles west of Anderson's Ferry and build a new track on private right-of-way along Commercial Avenue. Application has been made to the Public Utilities Commission to abandon this portion of the track.

Lorain, Ohio.—The Lake Shore Electric Railway and the Lorain Street Railway, a subsidiary, have received new franchises from the City Council of Lorain. The new grants provide for universal transfers and six tickets for 25 cents.

Harrisburg, Pa.—The Valley Railways has received a franchise from the City Council to double-track Walnut Street between Front and Second Streets, and providing for a terminal at Walnut and River Streets.

Charleston, W. Va.—The Charleston-Dunbar Traction Company has received a fifteen-year franchise from the City Council for the use of the Lovell Street bridge.

### TRACK AND ROADWAY

Clear Lake Suspended Monorail Company, Hopland, Cal.—It is reported that the Railroad Commission of California has approved the application of the Clear Lake Suspended Monorail Company to build its proposed line from Hopland to Lakeport, 22½ miles. Rails and steel have been purchased by Guy L. Hardison, contractor for the bridge across Russian River, and work will be begun soon. [Oct. 27, 1917.]

Kankakee & Urbana Traction Company, Urbana, Ill.—The Kankakee & Urbana Traction Company is constructing a switch which will connect the tracks of the Urbana & Champaign Railway, Light & Gas Company, a subsidiary of the Illinois Traction System, with those of the Wabash Railway Company at Urbana, Ill. The Kankakee & Urbana Traction Company enters Urbana through trackage rights over the Illinois Traction System and the Urbana & Champaign Railway, Light & Gas Company. The special work being done will enable the Kankakee & Urbana Traction Company to deliver cars of grain from various elevators on its line direct to the Wabash Railway Company.

Tri-City Railway, Davenport, Iowa.—New special work is being installed by the Tri-City Railway on Twentieth Street, Davenport.

Wichita Railroad & Light Company, Wichita, Kan.—An extension will be built by the Wichita Railroad & Light Company on Osage Street from Douglas Avenue to Dayton Street, thence west on Dayton to Millwood Street and south on Millwood Street to the Orient shops.

Boston (Mass.) Elevated Railway.—Notice has been sent to Mayor Charles M. Blodgett that the proposed subway extension of the Boston Elevated Railway to Malden Square will, because of present conditions, be deferred. The company is completing the elevated structure across the Malden bridge, between Charlestown and Everett, and will establish a terminal on the Everett marshes off Main Street, northeast of the Cochrane Chemical Works. Surface cars operating in Everett, Malden and points further north will unload at this terminal, it is now understood. Eventually



the site of the proposed terminal will be a station on the Malden subway. Work has already been begun filling in the marshy land for a foundation for the Everett terminal, and spur tracks are being laid from Main Street, Everett.

**Detroit (Mich.) United Railway.**—Plans are being considered by the Detroit United Railway for the construction of an extension of its Grand Belt line from Milwaukee and Mount Elliott Avenues east to Lynch Road, in order to serve the new munition factories which have been opened in that section.

**St. Louis, Mo.**—At a session of the Bridge Commission of St. Louis on Nov. 19, Mayor Kiel announced that the first street car permit on the municipal free bridge would be issued within sixty days to a line operating two cars at intervals of seven and one-half minutes during the rush hours. Eugene R. Sweeny, who promoted the Central Traction franchise in 1898, under which the United Railways Company was organized, will obtain the first bridge car permit in the name of the East St. Louis Interurban Electric Railway Company, a corporation just organized. It has leased a portion of the interurban line of the Southern Traction Company in East St. Louis and may operate cars from the post office there to the loop that the city expects to build at Chestnut Street. The line will be in operation within thirty days after a permit is issued, Mr. Sweeny promised the bridge commission. It will consist at first of only two cars and will operate only from one end of the bridge to the other. [Aug. 4, '17.]

**International Railway, Buffalo, N. Y.**—Grading is being completed on the extension of the International Railway through North Tonawanda and the work of laying tracks will be pushed throughout the winter until the line is completed. It is expected that the line will be in operation early next spring.

**Interborough Rapid Transit Company, New York, N. Y.**—The Public Service Commission for the First District of New York has asked the Board of Estimate to approve a contract for \$64,000 to make a permanent shaft in the Steinway tunnel near First Avenue, Manhattan. The shaft has been in existence for ten years and needs a permanent concrete lining. The bureau of contract supervision of the Board of Estimate recommends that the improvement be postponed until market conditions are more favorable. It has been announced officially by the Public Service Commission for the First District of New York that the two new main line subways in Manhattan, to be operated by the Interborough Rapid Transit Company in connection with the old subway system, will be opened to the public about Jan. 15. They are the Lexington Avenue and Seventh Avenue lines. The former extends north from Forty-second Street and will be connected with the lower part of the present subway. The Seventh Avenue line extends south from Forty-second Street and will be connected with the upper half of the old line at Forty-second Street. This will give Manhattan two north and south trunk lines, one on either side of the city. They will be separate systems as far as through operation is concerned. Most of the work remaining to be done on these two lines consists of station finishing.

**\*Chillicothe, Ohio.**—Tentative plans for the construction of an electric railway from Chillicothe to Camp Sherman have been prepared by Capt. T. E. Rhodes, construction quartermaster, and several Ohio capitalists, who are financing the plan from patriotic motives.

**Cincinnati (Ohio) Street Railway.**—Street Railway Commissioner C. W. Culkins has under advisement the construction of a short line between Fairview incline and the eastern terminus of the crosstown line at Woodburn Avenue and Madison Road for the purpose of increasing the service of the Cincinnati Traction Company in the vicinity of Fairview.

**Portsmouth Street Railroad & Light Company, Portsmouth, Ohio.**—Directors of the Board of Trade of Portsmouth have approved the general plan of the Portsmouth Street Railroad & Light Company for extending its line to Nauvoo, West Side.

**Pennsylvania Utilities Company, Easton, Pa.**—Arrangements are being made by the Pennsylvania Utilities Company to provide for an electric railway connection from its

Dock Street plant to the coal storage and ash-dumping grounds.

**Dallas (Tex.) Southwestern Traction Company.**—A contract has been awarded to the Missouri Valley Bridge & Iron Company, Leavenworth, Kan., at \$63,300, to construct a bridge across Trinity River at the foot of Commerce Street, and to the Creek Construction Company, Sapulpa, Okla., at \$15,000, to furnish materials; total cost \$78,300. The bridge will be a three-truss, 132-ft. structure, of steel and concrete. Grading has already been begun through the Trinity River bottoms between Dallas and Cement City and another force has been put to work between Eagle Ford and Irving. It is announced that the Dallas-Irving line will be completed and in operation within eight months. Rails for the entire line have been purchased and promise of immediate delivery has been made. All financial arrangements for the completion of the entire line have been made. It has been found impossible to purchase ties for the line in the open market and the Creek Construction Company has organized a force of timber cutters and is now cutting ties from lands owned by it in eastern Oklahoma.

**Texas Electric Railway, Dallas, Tex.**—H. B. Ross, general superintendent of the traction lines of the Texas Electric Railway in Waco, appeared before the City Commission to outline numerous improvements contemplated by the company. Mr. Ross said the company had ordered electro-magnetic automatic switches for Fifth and Washington Streets, Fourth and Austin Streets and Eighth and Austin Streets, and said that when these are installed the congestion at these corners would be greatly relieved. Mr. Ross also outlined plans for double-tracking certain portions of some lines and for passing switches designed to improve the schedules maintained on these lines.

**Petersburg & Appomattox Railway, Petersburg, Va.**—This company is rapidly completing its double-track extension to Camp Lee, near Petersburg, and part of the line is already in use to headquarters.

## SHOPS AND BUILDINGS

**Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala.**—This company reports that it will construct new carhouses and cold storage, equipment for which has already been purchased.

**Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa.**—A new passenger and freight station is being built by this company in Waterloo. The building will be of frame and stucco.

## POWER HOUSES AND SUBSTATIONS

**Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala.**—A report from the Tuscaloosa Railway & Utilities Company states that it will construct new power stations, material for which has already been purchased.

**Gary & Interurban Railway, Gary, Ind.**—The substation of the Gary & Interurban Railway at West Gary was recently destroyed by fire, causing a loss of about \$35,000.

**Kentucky Traction & Terminal Company, Lexington, Ky.**—An electric transmission line is being erected by the Kentucky Traction & Terminal Company from Georgetown to Cynthia which, it is expected, will be completed about Feb. 1, 1918. The plant at Cynthia will be closed down upon completion of the line.

**Owensboro (Ky.) City Railroad.**—A report from the Owensboro City Railroad states that it has purchased twenty GE-258 motors, to be delivered during the next twelve months.

**Public Service Corporation of New Jersey, Newark, N. J.**—Owing to conditions brought about by the war the Board of Public Works has sanctioned an agreement with the Public Service Corporation and the United Electric Company of New Jersey, which will release them from the necessity of expending \$25,000 this year for underground work in Elizabeth.

**West Virginia Traction & Electric Company, Morgantown, W. Va.**—This company is installing new stoker equipment in its local power plant, and will also install a new Westinghouse 1250-kw. turbine.

# Manufactures and Markets

Discussions of Market and Trade Conditions for the Manufacturer, Salesman and Purchasing Agent  
 Rolling Stock Purchases      Market Quotations      Business Announcements

## New England Roads Buying Carefully Assistance to Massachusetts Railways Expected at Forthcoming Legislative Session—Conditions of Prices and Deliveries

Inadequate revenues and high prices combine at present to create a rather quiet market for electric railway material in the Northeastern states. Hopeful signs are not lacking, however, of a better public understanding of the financial burdens of the operating companies. At the monthly meeting of the New England Street Railway Club last week Chairman Macleod of the Massachusetts Public Service Commission sounded a note of real encouragement to the struggling traction properties represented, and assured the roads of the support of the commission in meeting the present difficult situation. The special legislative commission investigating electric railways has returned from a two weeks' trip to Eastern and Middle Western cities impressed with the need of relief to the companies in this section, and there is ground for confidence that the forthcoming legislative session will witness some sorely required constructive assistance to the trolley properties.

Few substantial orders are being placed at the moment, but a new power plant is to be built at once to serve the Shore Line Electric Railway and other consumers in Connecticut from a site in Thamesville. The engineers and purchasing agents are the Harry M. Hope Engineering Company of Boston, Mass. The initial installation will comprise 20,000 kw. in two turbo units, with boiler equipment and auxiliaries. The Union Street Railway of New Bedford is also having a power plant built by the same organization, most of the equipment, however, having been purchased. Little transmission line and substation construction is under way at the present time, but the Boston Elevated Railway is in the market for about 12,000 ft. of 2,000,000-circ. mil cable, about 100,000 lb. of magnet wire and other conductors, anticipating requirements a few months ahead. Line and track construction by this company to the Squantum destroyer plant now under erection (capacity thirty-five destroyers in sixteen months, plant to be finished Jan. 1) is being handled from stock materials. On both the Boston Elevated and Bay State systems the demand for shop labor exceeds the supply. Government construction requirements have drained not a few maintenance organizations of valuable men.

Track construction is rather quiet at present except on work associated with war business. This is keeping special work makers unusually active and labor conditions are none too stable. Some private industrial track construction for electric railway service is under way at Greendale, an industrial suburb of Worcester, Mass. Track tools are quoted 75 per cent above a year ago and deliveries run from five to six months, compared with stock shipments in ordinary times. The government has commandeered practically the entire output of shovels for construction work in the war zone and in other military areas. Despite a very moderate demand for track construction equipment, deliveries are long, rail loaders being quoted at eight months (pneumatic type). Joints run from sixty to ninety days. Spikes have dropped in price from 7.5 cents to 4.1 cents per pound. Manganese frogs are 50 per cent higher than a year ago and deliveries run from six to eight months.

Car builders are actively engaged in filling previous orders, but little new business is being booked. Long and uncertain deliveries on steel are a serious handicap, and prices are unavoidably high on present rolling stock units. The larger New England car plants are engaged in government work at present. Requests for bids have lately been received for some outside interests, but costs are an

obstacle to closing. Interest in the one-man car is growing, if somewhat slowly, and at a hearing last week Vice-President R. B. Stearns of the Bay State company said that it appears that fifty such units could be used on that road at an approximate investment cost of \$300,000 and an annual operating saving of \$600 per car. The company is not in the market as yet, however, for this equipment.

The demand for trolley line material is rather quiet just now. Deliveries are quoted at six months on porcelain strain insulators, and it is rumored that a further advance in the price of porcelain will take effect before long. There is a decided shortage of the foreign labor employed in the potteries. Deliveries are rather improved on overhead frogs and crossings, barring railroad congestion. One factory is shipping its products by motor truck to New Haven, Conn., and thence by rail, on account of the difficulties in obtaining cars for siding service. Keystone tool grinders are being shipped from stock, and a 10 per cent price advance went into effect Nov. 1. High tension switches and power plant specialties are feeling the shortage in insulating material. Railway motors are quoted at from five to eight months, according to size. Little new business is being taken. Rotaries and transformers run from six to nine months on deliveries, with small present railway demands. Curtains show a 25 per cent advance this month, due largely to the increased price of cotton.

## Expediting All Orders of a "War" Character

### Manufacturers Everywhere Give Priority to Work in Which the Government Is Interested— Method of Procedure

Manufacturers are being notified by distributors of raw materials and by manufacturers of parts that if shipments of material are directly or indirectly entering into the manufacture of munitions and other necessary supplies for the war the orders will be expedited in every possible way. In these commitments it is specified that the destination and how the merchandise is to be employed must be stated. It appears, in this particular connection, that advantage is taken of current conditions by some buyers—none too scrupulous, reports say, when it comes to gaining an advantage for themselves, or maybe a customer in dire need of equipment or supplies which ordinarily would be "held up."

One of the representative distributors, in referring to this matter, said that while no notice had been given the trade, nevertheless all orders requesting priority of shipment on government claims were subject to the most careful scrutiny. The War Department, for example, in making an inquiry for prices or in placing an order, used a definite number on all of its transactions. Consequently, if a customer stated that the material or accessories purchased were to be part of or wholly devoted to the purpose of the government, the official number was requested and must be "proved up" before preference was accorded the shipment.

Other prominent concerns follow the same procedure, even if buyers have not been cautioned in advance. A certificate from the Priority Board is frequently insisted upon before the order obtains immediate attention and delivery is hastened. In addition to priority of execution, the best prices are quoted on every description of government orders, and such delays as occur in their completion and delivery are charged up to interferences caused by labor agitations along obstructive lines.

Shipments of war material going abroad, to the British

government, for instance, must arrange for cargo space through the Minister of Munitions. When the goods arranged for are ready for delivery to an "Atlantic port," a cable advises the English official to this effect, a priority order for quick transportation is forthcoming through the War Industries Board to the railroads, and the entire shipment, whatever it may be, is aboard the outgoing vessel without a hitch from the factory to the sea.

## Condition in Wooden Pole Market

### Railroad Embargoes Hindering Deliveries and Labor Situation in Woods Somewhat Disturbing

Considering the growing scarcity of suitable timber for poles and the reckless waste that has characterized this special kind of lumbering in the past, in common with wastage in other foresting operations, the demand is narrowing down to certain woods. That is to say, where trees peculiarly applicable from size and strength could be easily obtained in former times, local supplies were drawn upon to advantage when a favorable price and speedy and not costly delivery were paramount. In addition when timber, like chestnut and other woods, was of sturdy growth and plentiful, distant sections were not called upon for poles.

Within recent years disease has decimated chestnut trees in certain portions of the East to an alarming extent, but chestnut may still be cut in considerable quantities in some Eastern states and in the Middle West. Because of this situation to some extent cedar poles are being used more and more on Eastern lines.

Cedar poles are now coming from the South, Middle West, Northwest and Far West. An Eastern distributor said that no complaints of a serious shortage are reported, though the cut for the year is stated as being below the normal, on account of labor shortage. Also, though prices have advanced for reasons and along lines recognized as unavoidable, and while present conditions control, no further increase is anticipated, unless the unexpected happens. Deliveries, nevertheless, will continue uncertain, unless a certificate of official priority is attached. In such event the pole shipment will go forward with rapidity and reach its destination in record time.

One of the largest producers of chestnut poles states that the demand for poles is increasing. The increased demand, covering what is considered the selling period, i. e., Sept. 1 to May 1 last, was 149 per cent increase over gross sales for the corresponding months for the previous year. It is believed the current period will increase 25 per cent over this figure.

Because of the car shortage situation, and should the government request utility companies in general to utilize that product which is produced in their immediate vicinity, which would permit of a short haul and an early release of cars, a heavy demand in the East and Middle West for chestnut poles is expected to result, which it is felt will more than offset shipments which are made to other places.

A prominent pole authority expresses the opinion that it would not be at all surprising if during the period of the war the government should create zones in which the different varieties of woods, such as cedar, chestnut, yellow pine and cypress, would be assigned for exclusive use in certain territories. The purpose of such a plan, if it went into effect, would be to minimize cross shipments and tying up of railway equipment.

The demand for cedar poles from the West during the first nine months of this year showed a marked increase over the same period last year. Shipments during August and September were somewhat below the shipments for the same months a year ago. The increase of sales this year over last year is largely accounted for by the development of business in new territory. A large number of cedar poles have been shipped into New York, Pennsylvania, New Jersey, Massachusetts, Kentucky and Nova Scotia during this year. Until this year there has been practically no demand in this territory for cedar poles cut in the West.

The stocks in the hands of Western distributors at the present time are considerably below normal, due to the very light production during the last twelve months. The curtailment of production has been due almost entirely to labor conditions, which have been particularly bad during

the summer. There will be sufficient poles produced to take care of any reasonable demands during the next year, it has been announced, but the cost of producing them will be about double what it was two years ago. During the first part of the year shipments were badly delayed on account of car shortage, but the situation improved considerably during July, and there were practically no old orders unshipped at the beginning of the winter season.

The prices received this year are said to have been very satisfactory to the timber men, being considerably above those obtained during 1914 and 1915 and slightly above the prices of 1913.

The government is asking for and accepting almost anything to be had in the timber and lumber line for cantonment buildings. Quantity not quality is sought. The consequence is that in the South the yards are being cleaned up for the first time in their history and the wood pole supply and shipments suffer.

A week or so ago the government contracted for 200,000,000 ft. of timber, lumber and boards for shipment to France. This has disturbed the pole market considerably in the South, it is reported. Prices are constantly changing, the last advance, within a week or ten days, was \$4 a thousand. Quotations on poles must primarily be had from the mills before it was safe to submit them to the buyer. Then the price is subject to immediate acceptance, with whatever advances on freight charges as may be announced prior to shipment additional and without notice. About 40 per cent of the orders on cedar poles cut in the South are filled. The scarcity of labor in the forests and at the mills is also causing additional trouble.

Shortage of cars is causing no end of trouble. When a shipment is ready for forwarding application for cars must be made, though not by the consignor. Instead, the petition must originate with the consignee, who is obliged to detail the use to which the timber is to be put and every other reason for its shipping and delivery. After a lapse of several weeks possibly a permit may be granted. On an order placed by a Massachusetts utility three months ago for six cars of poles, two carloads have been delivered. The remainder is reported en route "somewhere in the South." Southern roads, it is reported, cannot be made to believe or understand the meaning of the embargo in the East. Sales of Southern poles are up to the mark, but the extraordinary state of affairs, as particularized, is interfering greatly with the acceptance of orders to which promises of definite delivery can be attached.

## Possible Call for Heater Economy Devices

### Market for Heaters Now Largely for Replacement Work, with Deliveries from Thirty Days to Three Months

With deliveries on nearly everything so unsatisfactory and dilatory, there seems to be a difference of opinion respecting promises that can be lived up to. It is agreed that if the specifications run along standard lines and sufficient pressure is brought to bear, shipments can be arranged on a mutually satisfactory basis. On car heaters, which are being installed, not so much on new cars—for few are being purchased, for obvious reasons, just at present—but to replace worn-out or defective equipment, the delivery date varies. While one manufacturer positively states he can lay down his car heaters in thirty days, another is equally emphatic in asserting it is impossible to deliver under three months.

The season is here when cars—unless operated in the tropics—must be heated. Undoubtedly the authorities will be more lenient as regards heating this year than ever before. The Public Service Commission in Massachusetts and that in the First District, New York, have already indicated that they will take this attitude in the interests of fuel conservation, and there are rumors of federal sanction of such a plan. Nevertheless, some heat will be needed, and heaters will be required. The shortage of fuel may, however, direct renewed attention to devices to reduce the consumption of current—or coal—in heater operation; in other words, to secure greater fuel economy.

**ROLLING STOCK**

Voldosta (Ga.) Street Railway is in the market for two small one-man cars.

Grand Forks (N. D.) Street Railway is considering the purchase of four new one-man cars.

Sand Springs Railway, Tulsa, Okla., has ordered from the G. C. Kuhlman Car Company, Cleveland, Ohio, one two-man motor combination passenger and baggage car 57 ft. in length for its interurban service. Four additional passenger cars, motor type, to be placed in operation on the same lines, will be ordered from the Cleveland builders. Of the latter two are open and two closed cars.

Northern Texas Traction Company, Fort Worth, Tex., is reported to have purchased six cars of the double-truck type from the Colorado Springs & Interurban Railway Company, Colorado Springs, Col. The cars were bought in St. Louis, Mo., and have been put in operation to relieve the traffic congestion that has arisen in Fort Worth since the establishment of the army cantonment and aviation camp.

**TRADE NOTES**

William S. Boyd, formerly assistant in the purchasing department of the Crucible Steel Company of America at Pittsburgh, Pa., is now purchasing agent of the Page Steel & Wire Company, Monessen, Pa.

Connecticut Brass & Manufacturing Corporation, Waterbury, Conn., has been formed to acquire and consolidate the Connecticut Brass Corporation, West Cheshire, and the Pilling Brass Company, Waterbury, Conn.

Richard H. Rice of the steam turbine engineering department, General Electric Company, West Lynn, Mass., has been elected president of the National Conference of State Manufacturers' Associations, which convened at Indianapolis, Ind., on Nov. 22.

A. H. Peterson Manufacturing Company, Milwaukee, Wis., is the new corporate name of what was formerly the P. & B. Manufacturing Company. The company will continue to manufacture the "P. & B." products, and a substantial expansion along these lines will shortly be announced.

The Brooklyn (N. Y.) Rapid Transit Company has made arrangements with the Wendell & MacDuffie Company, New York City, to dispose of certain motor and trailer cars now in daily operation and which are being replaced by new all-steel equipment. The cars will be available as the new cars are received and put into service.

Southern Ferro Alloys Company, Chattanooga, Tenn., organized with an authorized capital of \$210,000, advises that its plant is completed and in successful operation. The company believes it is a model of its kind. The Canada Carbide Sales Company of 30 Church Street, New York, has been appointed the Southern Company's exclusive sales agent.

J. S. Veatch is now the district sales agent of the Ohio Brass Company, Mansfield, Ohio, for the territory tributary to Denver, Col., in which city he will make his headquarters. With the new appointment the O-B Company has two generations acting as sales representatives; C. A. Veatch, the father, has for some years traveled through a section in the Middle West.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has appointed J. W. White manager of the power and railway divisions of its Detroit office. Mr. White was formerly connected with the Pittsburgh office of the company, subsequently becoming associated with the Allis-Chalmers Company, but has now returned to the Westinghouse Company, assuming the position above noted.

Hale & Kilburn Company, New York, N. Y., in the readjustment plan submitted, contemplates the raising of \$1,000,000 new cash capital. The additional working capital is needed in view of the interesting business and the larger volume of raw materials carried. The committee of stockholders, in a recent report, stated that "the plant is a large and valuable one in prime condition, with an able organization, and under its present management is being conducted on a profitable basis."

Bond Foundry & Machine Company, Manheim, Pa., has recently purchased, as a going concern, the property, plant and good-will of the Queen City Foundry Company, Toronto, Canada. In the future the Canadian plant will be operated as the Bond Engineering Works, Ltd., and in addition to continuing the manufacture of gray iron castings will make power transmission specialties. New buildings will be erected to take care of the increased business, which will be under the management of H. M. Lee.

Railway & Power Engineering Corporation, Ltd., Toronto, Canada, has been organized with headquarters in the Canadian Pacific Railroad Building, to conduct engineering and supply equipment for railway, light, power, mining and industrial plants. The president of the company is Theodore Malm, late of the Canadian Northern Railway System. Owing to the present abnormal conditions, the company announces that it has opened, temporarily, a "used equipment department" where all equipment sold is subject to the customer's inspection and that the company will give all possible advice and assistance in bringing the equipment up to its highest possible efficiency without added cost to the customer.

**NEW ADVERTISING LITERATURE**

Standard Underground Cable Company, Pittsburgh, Pa.: Bulletin 700-2 describes in detail and illustrates the company's outdoor cable terminals. Copies may be had on application.

Condensite Company of America, Bloomfield, N. J.: Illustrated booklet containing a brief but adequate outline of the properties and some of the use of condensite, the substances that the company describes as having broadened the field of plastic molding.

Standard Underground Cable Company, Pittsburgh, Pa.: A revised bulletin on Type D. O. A. outdoor cable terminals in which several new types of terminals are described and listed. Among these are the protected disconnection terminal, pipe-top terminal and borehole terminal. The bulletin gives tables of working voltages and sizes of conductors for which terminals of certain dimensions and weights are required, also instructions for ordering, installing, etc.

**NEW YORK METAL MARKET PRICES**

	Nov. 21	Nov. 28
Prime Lake, cents per lb.	23 1/4	23 1/4
Electrolytic, cents per lb.	23 1/2	23 1/2
Copper wire base, cents per lb.	31	30
Lead, cents per lb.	6 1/2	6 1/2
Nickel, cents per lb.	50	50
Spelter, cents per lb.	8	7.97 1/2
Tin, Straits, cents per lb.	77	80
Aluminum, 98 to 99 per cent, cents per lb.	36	36

**OLD METAL PRICES—NEW YORK**

	Nov. 21	Nov. 28
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19 1/4	19 1/2
Red brass, cents per lb.	17 1/2	17 1/2
Yellow brass, cents per lb.	14 1/2	..
Lead, heavy, cents per lb.	4 3/4	5 1/4
Zinc, cents per lb.	5 1/4	5 3/4
Steel car axles, Chicago, per net ton.	\$41.00	\$42.00
Old car wheels, Chicago, per gross ton.	\$31.00	\$31.00
Steel rails (scrap), Chicago, per gross ton.	\$34.50	\$34.50
Steel rails (relaying), Chicago, per gross ton.	\$55.00	\$55.00
Machine shop turnings, Chicago, per net ton.	\$15.50	\$17.00

**RAILWAY MATERIALS**

	Nov. 21	Nov. 28
Rubber-covered wire base, New York, cents per lb.	32-35	34
Rails, heavy, Bessemer, Pittsburgh.	\$38.00	\$38.00
Rails, heavy, O. H. Pittsburgh, per gross ton.	\$40.00	\$40.00
Wire nails, Pittsburgh, per 100 lb.	\$3.50	\$2.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	\$5.50	\$5.50
Steel bars, Pittsburgh, per 100 lb.	\$5.00	\$5.00
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	\$5.80	\$5.80
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	\$4.85	\$4.85
Galvanized barbed wire, Pittsburgh, cents per lb.	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	\$3.95	\$2.50
Cement (carload lots), New York, per bbl.	\$2.22	\$2.22
Cement (carload lots), Chicago, per bbl.	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.	\$2.65	\$2.65
Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.20	\$1.20
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.23	\$1.23
White lead (100 lb. keg), New York, cents per gal.	10	10
Turpentine (bbl. lots), New York, cents per gal.	51	51