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These Are the Three Ways Out

IN THE admirable informal remarks made by E. A. Maher, Jr., the incoming president, at the Lake George meeting of the New York Electric Railway Association last Saturday, the speaker made the point that the railways are confronted with the two-fold and urgent necessity, on the one hand, of introducing every possible operating economy and, on the other, of securing more income. He did not have time to elaborate his thought, but in the minds of his hearers undoubtedly the second of these alternatives automatically subdivided itself into two parts, namely, securing a higher fare per average passenger and increasing the number of passengers, particularly those of the most profitable varieties. There may then be said to be three ways out of the present difficulty, and while every effort is being made to increase (in a positive direction) the margin between income and outgo per passenger, the expanding of the business needs attention also. And not only are more passengers to be secured but as many of them as possible are to be persuaded to ride at other times than during the rush hours. The fact is that if the business can be properly expanded it will be considerably easier to maintain the much-desired margin already referred to.

Electricity As a Rival of Steam on Railroads

LESS than usual has been heard lately regarding electrification of steam railroads because war work has absorbed attention. Electrification is too much of a long-time process to have been favorably affected during those months of quick results. Now that times of comparative peace have arrived, and attention is being directed as never before in the line of conservation, this topic is bound to come in for renewed consideration.

Electrification offers a wonderful opportunity for saving in capital expenditure, particularly in those cases where expanding business demands new facilities which by other means would be inordinately expensive to provide. This was the prime consideration with the Norfolk & Western Railway and the Pennsylvania Railroad (Philadelphia terminal), and an important one in other instances. In the case first mentioned the higher, sustained speeds of electrically-hauled trains on heavy grades offered an irresistible opportunity to expedite traffic. In the second case cited the situation was different, the flexibility of make-up and movement of multiple-unit suburban trains being the deciding factor. To some advocates of judicious electrification the conservation of capital appears to be the predominating element.

Possibly the matter of anticipated fuel economy has been urged more forcibly than other arguments by the

proponents of electricity as a source of railroad motive power. The fact that it offers the only possible connecting link between the waterfall and the locomotive gives it an unique position, analogous to that of alternating current in the general power distribution field. It is possibly more difficult to "prove out" the economy of electric operation on this basis, but it is certainly sound over-all conservation to use to the limit a form of motive power that cuts down materially the rate at which the supplies of coal and fuel oil are being depleted. The general public ought if necessary to be willing to help in financing a proposition that will accomplish this result.

Nothing has been said here as to the electrification of tunnels and city terminals, where considerations other than capital or operating economies have ruled. Here the expenditure must be justified on grounds of necessity, and there is nothing left for argument once the controlling premises have been laid down.

Electric Locomotives Must Be Handled as Such

AMONG the articles in this issue which bear on the subject of heavy electric traction, one that contains a direct message to the men responsible anywhere for the operation and maintenance of electric locomotives is that by A. H. Babcock, consulting engineer Southern Pacific Railroad. The message should be taken to heart by the interurban railway man who has freight locomotives under his care, as well as by his brother in the steam railroad field. The message is that in view of the characteristics of electric motors they cannot be handled in the same nonchalant fashion as is possible with steam engines. The very property which lies behind the virtues of the electric locomotive renders it subject to possibility of abuse, inadvertent possibly, but nevertheless injurious.

When the steam pressure from a locomotive boiler is given free access to the engine piston it can produce a definite force and no more. And this force can do no harm to the machine as a whole. If the load is too heavy the engine "stalls," that's all. But there is nothing to limit the current that can be drawn by an electric locomotive except the power plant and line capacity, the setting of the circuit breakers or the breakdown point of the motor insulation. Years ago W. S. Murray pointed out the proneness of engine operators, transferred from steam to electric locomotives, to overload the latter. If this is done the result is excessive maintenance cost and all-around and undeserved condemnation. At the same time it is not desirable to give the protective devices too low a setting because it may be necessary at any time to impose upon the motors for a short time overload. The operator must not permit the "willing horse" to pull too hard.

Taking Out a New Lease On Industrial Life

THESE seem to be three classes of people in the electrical railway business at present, as disclosed by the strenuous period through which it is now going. One sees a big future of usefulness and reasonable profitableness ahead, after some difficult but soluble problems have been mastered. Another wishes to salvage the present investment and get into some line of activity where good work is better appreciated. The third doesn't care a rap what happens. The industry and the public are to be congratulated that the first class is large and that there are hosts of able men who will fight to the last ditch to safeguard the business. The men in the second class will stand by if they see a reasonable chance of victory. Good riddance to the others if they quit! What is needed now is a freshening of hope and faith in the integrity and stability of the business, with a renewal of the vigor and vim of the early nineties.

Standardization Must Take a Logical Course

RAILWAY officials who are buying equipment to-day consider that the motor of two years ago is quite obsolete and insist on having the latest design for their new equipment. Probably these motors of to-day will be superseded in their turn by others as the art advances, although it is reasonable to expect that changes will be less frequent and radical as time lapses. The railway motor has been mentioned simply as an example and is but one of the various parts which comprise the car equipment. In developing a satisfactory design the manufacturer produces the best that he can at the time that it is manufactured. This equipment is placed in service, and perhaps some of the detail parts do not work out in an entirely satisfactory manner. In the next design the engineer will try to overcome these troubles and objections, and although the changes at first may be considered as very insignificant, they often lead to far-reaching changes in design.

As an example let us consider the changes which have been made in the contour of the teeth in the gears of some of our late-type railway motors. A few years ago manufacturers would have been willing to say that they could standardize on a tooth of a particular shape. One of our foremost motor designers stated that by the change in the shape of the teeth used he had been able to eliminate one tooth from the pinion of a railway motor. But in doing this he changed the gear ratio and required a corresponding change in the speed characteristics of the motor. This speed adjustment actually produced a far-reaching economy which would never have been expected as a result of a small change in the shape of the teeth in the gears.

If a standard is adopted for any detail of the equipment the manufacturer will endeavor to build the other parts of the construction around this standard. In doing so, is it not possible that some standard may be adhered to when a small change might produce results beyond those intended and lead to unexpected progress? The interest of the manufacturer and the purchaser is a mutual one in regard to using standard parts. The manufacturer desires to minimize the number of special dies and tools required, and by using parts of the same dimensions, or parts exactly alike, in the various types of construction, great economy in their manufacture results. Operating officials are equally in-

terested in keeping down the number of repair parts which it is necessary to carry in stock to maintain their equipment. The stocks of these soon reach enormous proportions and in comparing some parts which vary only in a few slight dimensions the official sometimes concludes that proper foresight has not been used in their design, or that proper co-operation among the manufacturers has been lacking. On a large scale operating engineers will admit that it is not practical to expect standardization. A universal motor that can be built by all manufacturers would soon be obsolete. Automobile manufacturers bring out a new model every year. A universal motor that changes every year would be of no benefit as far as reducing the number of spare parts necessary to maintain it is concerned. Each new customer brings new ideas in construction and new problems in operation and maintenance to be overcome. Equipment designs advance by using the best of these ideas and by solving the problems for the industry. Interchangeable armatures, field coils, brush-holders and bearings in a modern railway motor would discourage advancement, but no doubt many small parts which have been used for years and continue to be used, could be standardized so as to help improve conditions. We hope something can be done along this line.

The Low-Cost Producer Merits His Reward

THE grant of a 2-cent transfer charge to the car lines in Washington, D. C., while apparently made merely as an expedient to give the particular amount of additional revenue deemed to be necessary, will in all probability bring results of great interest to electric railways in general.

That the cost of transporting a passenger for two-line riding is greater than that for single-line riding has been widely recognized, and it has been admitted that the imposition of a transfer charge is theoretically justifiable. But in particular cases questions of practicability have often been raised. Transfer riding is to a large degree convenience riding; will it not therefore be seriously reduced by an added charge? The transfer passenger who is required to pay extra for a ride of a few blocks around the corner is not likely to view with equanimity a long free ride for others on the main line past the transfer point; will there not therefore be an incessant clamor for through routing?

These troublesome matters, together with the fact that the financial needs of electric railways have generally been such as to demand greater aid than that obtainable even theoretically from a transfer charge, have caused the trials of this device to be very limited. Consequently the results, upon traffic, routings and revenues, of the addition of a 2-cent transfer charge in Washington to a flat 5-cent fare, are likely to be instructive, even if the suitability of a transfer charge as the main means of revenue assistance in most cases must be doubted.

The novelty of the Washington decision, however, lies not so much in the transfer charge itself as in the grant of such aid both to the needy Washington Railway & Electric Company and to the inferentially non-needy Capital Traction Company and Washington-Virginia Railway. The commission finds justification for this unusual proceeding in the fact that owing to competition a transfer charge for merely the Washing-

ton Railway & Electric Company would result in a diversion to the other companies of sufficient traffic to offset the gain in revenue from the transfer charge.

Regardless of this matter of traffic, the award of the transfer charge to the more prosperous companies has economic justification. The cost of production—the price determinant—is in the case of the Washington Railway & Electric Company not that of the least efficient high-cost *entrepreneur* but that of a representative average-cost producer. It is economically just that this average cost should fix the normal price of the railway ride in Washington. To be sure, the other companies—the low-cost producers—will reap the gain of ability and fortune, but until such time as the public does everything in its power to effect a unification of all lines upon a consolidated cost basis the low-cost lines are fully entitled to their reward.

Where Hope for the Railways Lies

WE BELIEVE that the most encouraging event of the last few years in electric railway affairs has been the appointment of two impartial commissions to investigate the existing electric railway problem, the one to represent the United States Chamber of Commerce and the other the United States Government. It has not been difficult for those who are actually engaged in electric railway operation to have foreseen for a long time that a crisis was coming in the affairs of these properties. For many years the margin has been growing smaller between income and outgo, but although electric railway operators realized this fact, they had difficulty in making anyone else understand it. The depreciation of the dollar during the past two or three years has of course accentuated these conditions tremendously, so that not only has all new construction now stopped but the whole industry has been projected into the condition with which our readers are unfortunately too familiar.

A solution of the matter is now to be sought by interests which are outside of the railway industry proper but, at the same time, are vitally interested in the maintenance of railway credit and service. The two commissions are admirably fitted for their tasks, the Chamber of Commerce body being able to enlist the interest in the investigation of chambers of commerce throughout the country while the federal body represents federal, state and municipal governments, the investors, the operators, and labor. On these two commissions will devolve the task not only of investigating the condition but suggesting a remedy. It would be useless now to speculate on what the best solution is to be. That is the question to be decided by the two committees. We may express the hope, however, that the study will be carried forward with dispatch. The high standing of the members and the sacrifice which all are making to participate in this hearing indicates an appreciation by them of the seriousness of the situation.

Electric railway companies will be derelict in their trust if they do not assist the two commissions in every way which is open to them. Presumably, some data will be required after both investigations get well under way, and possibly some personal testimony on the condition of the industry. Both of these the industry and all connected with it should cheerfully furnish. This, at least, is one way in which the railways can assist and it is essential.

Help the Schedule Maker to Save Car-Hours and Car-Miles

MOTIONLESS cars cannot increase a company's "income." In this statement may be summarized several of the strong points made in a recent address before the Public Service Railway company section by Alexander Jackson, which was abstracted in our issue of May 31. Another fundamental truth is "the time-tables of an electric railway property are the cornerstone upon which the financial structure is built."

Some years ago, before the unions were insisting on easier working conditions, the minimum day's pay was hardly known and schedules were arranged so that tripper cars could be placed where needed without adding seriously to platform expenses. This, of course, was an advantage to the riding public. Later, as the unions had their way, many companies were compelled to pay for six, seven or eight hours' work whenever a trainman was assigned to a run, and the result was a penalty on tripper service. Moreover, contracts with unions on certain properties called for payment of bonus time at the beginning of a day's work, at the end of a day's work, for dinner reliefs, etc. All of which meant other additions to car-hours which had to be paid for by the companies.

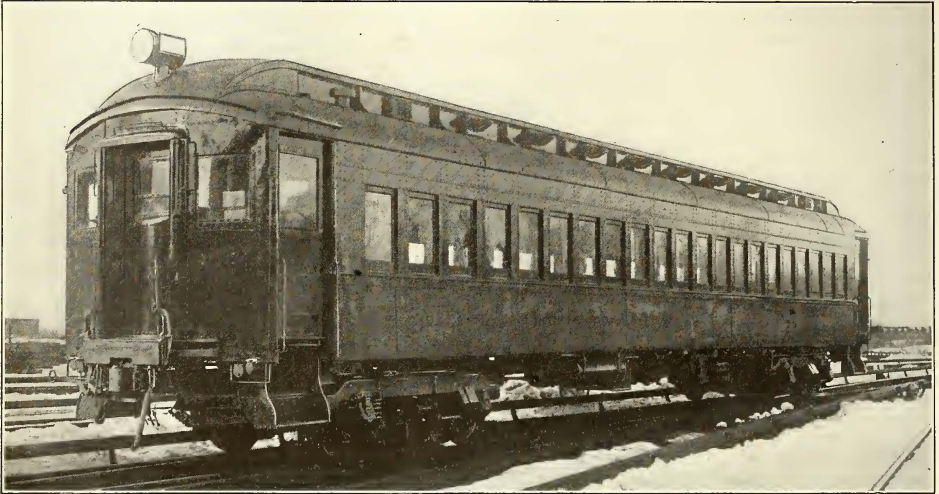
Mr. Jackson shows that \$150,000 would be added annually to platform wages on the Public Service property if only two minutes were allowed as additional layover time on the 14,274 trips operated daily by that company. A person who is not familiar with schedule making or with operating details would be likely to overlook the serious effect of such a change in schedules. Hence the necessity for giving serious heed to the advice which Mr. Jackson offers to division superintendents and other officials upon whose recommendations time-table changes usually are made.

In city service where delays are frequent it would be impracticable, of course, to build schedules on the exact uninterrupted running time between terminals. There must be allowance in the schedule for "slack" to permit the cars to leave on time even if an ordinary blockade takes place. The amount of this "slack," however, can only be determined by an efficient schedule maker, and if the best results are to be secured the men who are intrusted with such work must have the support of the management against the protests of road officers who may be incapable of weighing the company's interests against the demands of some dissatisfied trainmen.

Every competent operator knows that it is just as easy to give too much service as too little, and he is aware also of the dangers in either extreme. Schedules, of course, should be based on preliminary surveys of traffic requirements. They should be supported by adequate supervision of service with a view to preventing bunching of cars. Frequently it will be found that there are enough cars on the various lines if they are properly distributed. Division superintendents and supervisors can perform a very useful duty in reporting inadequacy of service or too liberal layover time at terminals, and the operating executive should never let them lose sight of the fact that each car must earn its proportion of revenue and that it cannot do this unless it holds its place on a well-considered schedule. A car on the street (when traffic awaits it) is worth a dozen in the depot or at lay-over points. "A rolling stone gathers no moss" was not written of the electric car.

New York Central's Latest Motor Cars

For Suburban Service on Its Electrified Zone the New York Central Railroad Has Just Placed in Operation a Number of 59-Ft. Multiple-Unit Passenger Cars That Differ From the Company's Previous Equipments in Many Respects, Both in Structural Details and Electrical Equipment



COMPLETELY EQUIPPED CAR READY FOR SERVICE

AS A REPRESENTATION of fifteen years' experience with a uniformly successful steam railroad electrification, the New York Central's latest motor cars, just placed in service, attain no ordinary degree of importance. The design, which has been worked out by the engineers of the New York Central Railroad, follows steam railroad standards in so far as the electrical equipment will permit. This is to be expected in view of the fact that the cars are operated on one of the most important of American suburban electrifications, the construction having been based upon the possibility of operation with standard steel passenger coaches as trailers as well as that of operation in trains behind steam locomotives in case of movements beyond the limits of the electric zone. To that end the cross-section dimensions and the external appearance practically coincide with the road's rolling equipment for trunk-line service.

For the new car's trucks, however, there exist the material differences necessitated by the introduction of the electric equipment, and the four-wheeled design, instead of six-wheeled arrangement that is used for the locomotive-drawn coaches has involved particularly heavy construction to conform with the general plan, axles of $8\frac{1}{16}$ in. diameter being used on the motor truck together with $6\frac{1}{16}$ in. x 11 in. journals. In addition, the need for provision for making up trains on the curved yard tracks, due to the space restrictions at the New York terminal, has required a radial draft gear whereby the coupler shank is moved by spring connections to the

truck end frame in accordance with the radial movements of the truck on the curved track. A coupler with an extended guard arm has also been provided. The minimum radius of curve around which the cars are required to operate normally is 135 ft., equivalent to a 42-deg. curve.

In the suburban service for which the cars were designed, a maximum speed limit of 55 m.p.h. has been established. This moderate figure, however, gives rather a wrong impression of the severity of the service, which calls for twenty-three stops in 34 miles on the line along the Hudson River to Croton, and for nineteen stops in 22 miles on the line to White Plains, the schedule speeds for local trains on these runs approximating respectively 27 m.p.h. and 24 m.p.h. For local express trains on these two lines the schedule calls for 29 m.p.h. and 30 m.p.h., with 10 and 9 stops respectively. As the weight of the complete car approximates 65 tons empty, or, say, 71 tons with a full passenger load, the work required of the two 190 hp. motors with which each car is equipped may be seen to be by no means light.

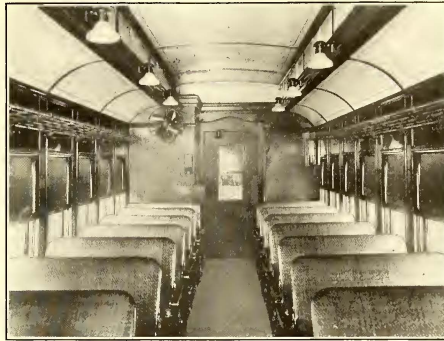
STRUCTURAL DETAILS

As may be expected from the foregoing outline of the service, involving the possibility of mixed steam and electric operation, the new cars are notable for their ruggedness of construction. The bodies are built up on the truss-side principle, with the stresses due to the span of 44 ft., 10 in. between center plates carried by

the entire side of the car. The side posts are relatively wide in comparison with the height of windows and their spacing, and rigidity sufficient for the posts to do their share in transmitting longitudinal shearing stresses between the roof and floor of the car is provided for by a wide letterboard and channel at the eaves and a $\frac{1}{2}$ -in. sheathing below the windows. Buffing and pulling stresses are largely taken up through an underframe which includes two 8-in., 21.5-lb. channel center sills as well as the side sills which are 4-in. x $3\frac{1}{2}$ -in. angles reinforced with Z-bars approximately 9-in. height, 6 in. total flange width and $\frac{1}{2}$ -in. thickness.

At the bolsters the side and center sills are tied together by a huge steel casting that combines the functions of the body bolster, end sills, and platform sills and also of that part of the center sills ordinarily extending out beyond the body bolster. Support for this casting is provided by framing into it the center sills and the bottom members of the truss that is made up from the construction of the car side; and so long as this heavy casting remains straight it is, therefore, impossible for the platform to sag. At the same time buffing strength is provided by the rigid tying together of all longitudinal members at the bolster.

The floor, which is supported on the usual system of cross-bearers and stringers, is made up of composition resting on $\frac{3}{8}$ -in. galvanized steel flooring of No. 22 gage. The total thickness is $1\frac{1}{2}$ in. Over the platforms there extends a $\frac{3}{8}$ -in. floor plate, and this is surfaced with an anti-slip tread. The false flooring to deaden noise and support the hair-felt heat insulation is located $3\frac{1}{2}$ in. below the main floor between body bolsters and at the



INTERIOR VIEW OF FINISHED CAR, SALOON END

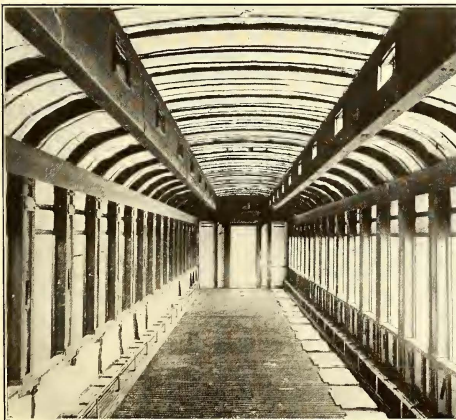
side plate, and to this is riveted a $\frac{3}{16}$ -in. letterboard $11\frac{1}{2}$ in. wide. The belt rail is located outside of the side sheathing and is $4\frac{1}{2}$ in. wide by $\frac{3}{4}$ in. thick. Inside the wall, 10 in. from the top of the finished floor, is a $\frac{3}{8}$ -in. thick truss angle that extends out $3\frac{1}{2}$ in. to support the wall ends of seats and the heaters, and below this is riveted the heater box of light steel pressed into channel shape.

At the ends of the car the bulkheads are built up on 6-in., 15.7-lb., Z-bar corner posts, and 6-in., 12 $\frac{1}{2}$ -lb. I-beam end-door posts, with intermediate posts made of $\frac{3}{8}$ -in. pressings $7\frac{3}{8}$ in. deep. Along the vestibule eaves is a body end plate of 6-in., 8-lb. channel framed into the side plate with a pressed gusset, and it is reinforced with a horizontal $\frac{1}{2}$ -in. plate 12 in. wide extending for the full length of the end-plate channel.

To take the impact of an over-riding platform in case of collision are vestibule end posts of 6-in., 12 $\frac{1}{2}$ -lb. I-beams behind $\frac{3}{8}$ -in. pressings, as well as vestibule corner posts that are built up with $\frac{1}{2}$ -in. plate pressed into the form of a flattened ellipse, these serving on one side for the vestibule door jambs.

A monitor roof has been provided in accordance with

car ends, and outward from the body bolsters similar provision is made by riveting $\frac{1}{16}$ -in. sheet steel to the under side of the bolster and platform casting. The superstructure, as previously mentioned, begins with a $\frac{1}{2}$ -in. side sheathing attached to side posts that are made up from $\frac{3}{16}$ -in. channel-shape pressings $4\frac{3}{16}$ in. wide and $2\frac{1}{2}$ in. deep, two of these pressings being set up face to face $7\frac{1}{2}$ in. apart and joined with $\frac{1}{2}$ -in. plate to form each post. At the top of the posts is a 4-in., 5.25-lb. channel which serves as the



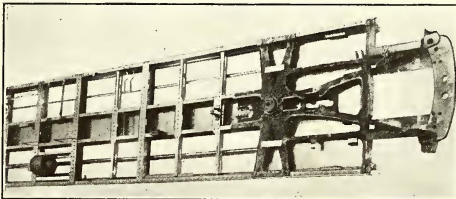
CONSTRUCTION VIEWS TAKEN DURING APPLICATION OF HEAT INSULATION AND AFTER THAT OF WAINSCOTING AND STEEL MOLDINGS

the plan of making the new cars similar in appearance to the road's standard passenger coaches. Its supports are the customary pressed steel carlines spaced 2 ft. 8 in. center to center for the upper deck. The roof sheathing for the upper deck is No. 14 gage steel with joints welded, and for the lower deck, generally, of $\frac{7}{16}$ -in. steel. Copper gutters of No. 18 gage metal are provided over doors and motorman's windows, these being riveted and soldered to the roof sheets.

For the protection of the car interior against temperature differences existing outside there has been used insulation consisting of layers of hair felt stitched with layers of sheet asbestos between them. This insulation has been introduced both above the false flooring and behind the finishing material at the sides of the car, being cut to form, and set in place as shown in one of the accompanying construction views.

CAR BODY

In its general arrangement the car body follows standard practice, except, perhaps, in regard to size. This appears in the comparatively high seating capacity of eighty-two, which figure has been attained with an over-all length of 69 ft., 5 in. by the adoption of a 32-in. seat spacing, the seats being designed with relatively thin backs upholstered in rattan. The side post spacing agrees with the seat spacing. The car length of



UNDERSIDE VIEW OF ONE-HALF OF UNDERFRAME

the car body is 59 ft. Because of the ample clearance prevailing on the trunk line of which the electrified zone is part, a width over side sheathing at the sills of 9 ft., 9 in. is permitted, and this in turn permits a seat width of 3 ft., 5 $\frac{1}{2}$ in. and a 24-in. center aisle.

Freedom from combustible material has been emphasized in the interior construction. In fact, only window sills, sash, arm rests on seats, and toilet hopper seats and covers have been made of wood. In general, Cuban mahogany has been used for these details, and the scheme of interior decoration has been made to match the color in the lower portion of the car, while the headlinings are painted in pearl gray enamel.

For the interior finish steel and waterproof material have been used throughout, including integral window frames which extend from the window stooling to the plate molding. Wainscoting between window stooling and seat-rest angle is of $\frac{3}{4}$ -in. material in 9-ft. lengths, joints being made with steel battens. The headlining is $\frac{3}{16}$ in. and $\frac{1}{4}$ in. thick and is fastened with steel ceiling battens and screws. All partitions are double and are fastened to the car framing with standard channel fasteners.

All doors, except that for switchboard cabinet, are of built-up steel construction, ranging from, $\frac{13}{16}$ in. to 1 $\frac{1}{2}$ in. thick, with pressings that conform to the general finish of the car. At the vestibule ends the doors are

designed to swing open and cover the control equipment in accordance with the very general practice. All doors, it may be said, are mounted to swing, not to slide. They close against pieces of solid rubber bound with metal, as well as $\frac{3}{8}$ -in. zinc and gray rubber weather strips at the top and sides of the door openings. Reinforcements of the doors for the application of door locks and hinges are welded to the door frames. Spring balanced trapdoors are provided for use at the Grand Central Terminal in New York, where the station platforms are at the level of the car platform. The upper sides of the trapdoors are covered with $\frac{3}{8}$ -in. inlaid rubber tiling laid on cement.

All windows are single and in one part. Cuban mahogany sash, 1 in. thick, have been used, and these are made tight with weather stripping all round the outside as well as on the inside at the top. Window sills and drop aprons are also of Cuban mahogany set in paraffin. American polished plate glass $\frac{3}{4}$ in. thick is used for all sash except for the saloon window, which has pressed prism plate glass.

An ingenious arrangement for the electric heaters provides for their location in a lined box along each side of the car between the floor and the previously-mentioned truss angle. As the heaters have been spaced with regard to the seat spacing, any defective unit may be easily removed without disturbing its seat, while the wide and substantial strip of metal above the heaters protects them from damage by passengers' feet. A perforated front plate provides for the escape of heated air.

Ventilation is provided for by twenty-one exhaust-type ventilators at the clerestory and a fresh air intake at each end of the car. A separate ventilator is used for the saloon.

The system of artificial lighting follows the principle of direct illumination that has become practically standard on electric cars in recent years. The location of the lamps is at the bottom of each side of the clerestory, and the translucent shades have a base that flares outward at quite a wide angle. Along the center line of the ceiling are the usual emergency lights with clear globes.

The carbody complete, with all equipment and ready to mount on the trucks, weighs 83,700 lb.; the trucks weigh 45,300 lb., of which 29,400 constitutes the weight of the motor truck with its motors, and the total weight of the complete car ready for operation is 129,000 lb.

MOTORS AND CONTROL

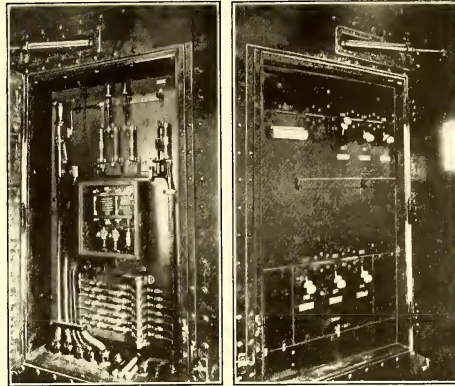
Owing to the fact that the new cars are considerably larger than those originally placed in service on the New York Central electrified zone, the propulsion equipment is proportionately more powerful than that with which the original suburban equipment was provided. In consequence the new motors were specified to perform any service, on cars weighing 75 tons loaded, that is now being performed by the motors on the original 58-ton cars, and it has been required also that they shall operate satisfactorily on trains made up indiscriminately of the old and new types of cars.

The motor is provided with tapped field, commutating poles and self-ventilation. It operates normally at 600 volts direct current but is capable of successful operation at voltage up to 750. Space restrictions have had a marked influence on the design, owing to the use of clasp brakes and the desire to utilize standard electrical

construction, and to this end the gear face has been reduced to 4½ in. in place of the 5-in. face that would ordinarily have been used. Above the rail 4½-in. clearance has been provided, the wheels being 36 in. diameter. The details of construction follow standard practice generally, including provision for brush holders that will give 1 in. brush wear on a commutator 2 in. smaller than the original diameter and an arrangement of brushes that will prevent wearing of ridges on the commutator. A density of 60 amp. per square inch of brush section has been set, this being based on the average accelerating current. The gears are solid and of rolled steel, and the pinions are forged. The gear ratio is 2.83 with 18 pinion teeth and 51 gear teeth.

Spring support for the motor nose has been adopted, the design providing for four compression springs to take the load due to the downward pressure from the motor weight and two compression springs (underneath the lug on which the former four springs rest) having long bolts that extend up through the yoke that holds the motor nose down. The safety lugs are novel in that they carry clips for the motor leads and are provided with holes to allow them to replace the customary bail, which has been eliminated because of interference with the leads. Another feature is the axle bearing lining, the metal being chamfered off to clear altogether the fillet at the collar while a large bearing surface against the collar in a vertical plane is provided to take the horizontal pressures set up under operating conditions.

When tested on the stand the actual one-hour rating of the motor is 190 hp. For acceleration a current averaging 250 amp. has been adopted. Under these



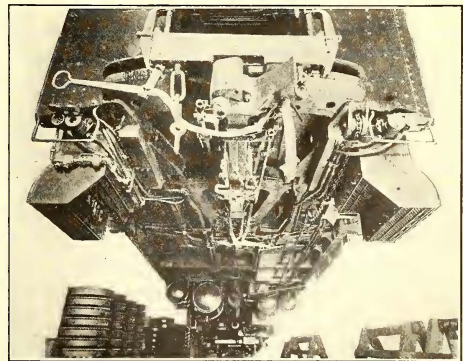
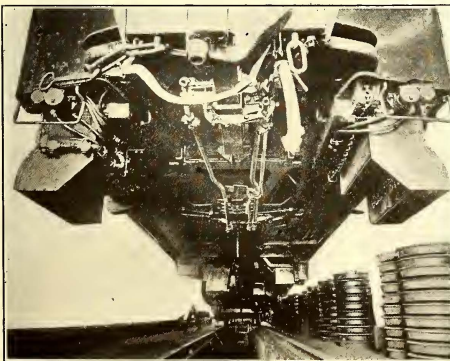
MOTORMAN'S AND TRAINMEN'S SWITCHBOARDS, THE FORMER PROVIDED WITH INTERLOCKED DOORS IN FRONT OF SWITCHES

conditions the motor gives a tractive effort of about 3500 lb. which in turn provides an acceleration of about 1 m.p.h.p.s. Electro-pneumatic control has been installed. These equipments, like other features of the new cars, have been so designed that they will operate in conjunction with the control system furnished on the original cars. An effort has been made to have a considerable number of the parts entering into the new design interchangeable with those of the old. In general principle the new control follows the arrangement of having all power circuits made and broken at a pneumatically rotated drum which is mounted

beneath the car floor and which is governed in its movements by a master controller in the cab. No reversing handle is provided for the latter, movement of the train in the opposite direction being effected by movement of the main controller handle in the opposite direction from the off position. Under this arrangement only series connections are provided for the reverse, since backward movements are invariably made at low speed.

Acceleration may be accomplished either automatically or by hand, the former being under control of the current-limit relay on each car, and there are ten notches for forward running and six for reverse, these including, of course, the running positions made available by the field control as well as the customary intermediate running points.

Train wires are seven in number exclusive of the bus line, and two of these wires must be energized to close the motor circuit. For full operation with the earlier cars one train wire is arranged to connect with the circuit-breaker trip wire, and energizing this provides for shutting off current from the motors. Further safety provisions include the customary return of the



UNDERSIDE VIEWS OF TRAILER AND MOTOR TRUCK ENDS, SHOWING ARRANGEMENTS OF PNEUMATIC AND ELECTRICAL AUXILIARIES GROUPED RESPECTIVELY AT THE TWO ENDS TO SIMPLIFY CONNECTIONS

controller handle to off position when released by motorman, as well as interlocks to insure proper sequence of closing contactors.

TRUCKS

Both motors for each car are mounted on one of the trucks the other, or trailer, truck being designed with journal centers of 77 in. instead of 80 in., a maximum axle diameter of $7\frac{3}{8}$ in. instead of $8\frac{1}{16}$ in., and $5\frac{1}{2}$ in. x 10-in. journals instead of the special size of $6\frac{1}{2}$ in. x 11 in. required by the unusual weight on the motor truck. The wheel base of both trucks, however, is 8 ft., and both are fitted with clasp brakes. The theoretical center plate load for which each truck was designed was 61,000 lb.

Steel pressings have been used for the side frames and end frames and connections are generally made by riveting, but where bolts are used they are tapered $\frac{1}{16}$ -in. in 12 in. in all cases. The transoms and bolster are steel castings, and renewable wearing plates have been provided for them as well as for the pedestal jaws. It may be mentioned also that all holes in castings for pins have been bushed to provide for easy repair following wear.

Braking pressures for the clasp brakes are designed to reach 100 per cent of the weight carried on the rail by the motor truck wheels and 90 per cent of that of the

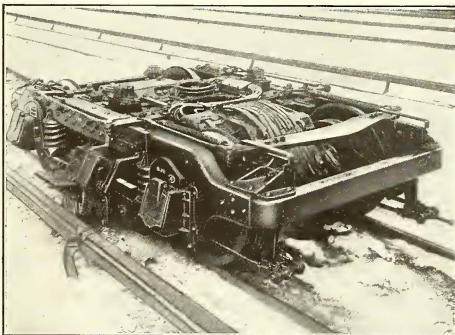
and journals is effected by corrugating the surface of the hinge and also that of the shoe casting that bolts to it.

The truck wheels, which as mentioned previously are of 36-in. diameter, are of the single-plate, solid-steel type and are of standard passenger coach design for the trailer truck, while for the motor truck they are provided with special hubs for the gear cases and to take the end thrust from the motor.

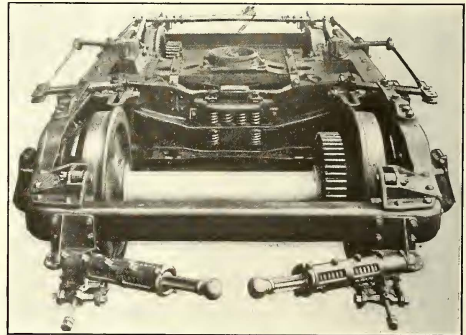
M. C. B. type journals with collars have been adopted, but the journal brasses have downward extensions to hold the journal firmly in place at all times, even though clasp brakes have been provided, this design being substantially in accordance with the principles of the semicircular journal brass pointed out several years ago as essential to high-speed electric railway car design. Journal boxes are of substantial standard design.

MISCELLANEOUS EQUIPMENT

As the cars may sometimes be hauled, outside the electrified zone, behind steam locomotives equipped with automatic, quick-action, high-speed brakes operating with 110-lb. train-line pressure, it was necessary to provide control equipment to permit the car brakes to operate under this condition or independently. The compressor is mounted on rubber pads to prevent its vibration from being transmitted to the car. Its work is



MOTOR TRUCK COMPLETE WITH MOTORS, THIRD-RAIL SHOES, SHOE FUSE BOXES AND BRIDGE FOR MOTOR LEADS



VIEW OF MOTOR TRUCK, SHOWING SPRING SUSPENSION FOR MOTOR NOSE AND PUSH RODS FOR CENTERING DRAWBAR

trailer truck wheels in a service application, when the car is without passengers. The shoes are steel-back type and the heads malleable iron.

The third-rail shoe beams are bracketed to the equalizer bars on either side of each truck and to each beam is attached the third-rail shoe rigging. A feature of the New York Central standard for this construction is the installation of a spring pressure device which takes the form of a hinge working against a spring in the bracket that is attached to the shoe beam. This hinge permits sufficient motion at the shoe (which extends a considerable distance outboard from the hinge joint) so that the shoe can follow inequalities in the third-rail. The shoe however is in the form of a casting that has notched arms between it and the point of attachment to the hinge casting, so that it is easily broken off in case it strikes an obstacle and thus does no damage to the hinge. Adjustment vertically to provide for the effect of wear at the wheels

is lightened by the use of a slack adjuster of the piston travel regulating type. A pneumatic signal equipment is provided for each car.

Equipment for heating consists of 34 two-coil, truss-plank electric heaters along the side of the car beneath the truss angle, and two five-coil heaters in the vestibules. The car-body heaters have thermostatic control equipment, and also, provision for hand control has been made for use in case of failure of the automatic devices.

A feature of the auxiliary equipment appears in the trainmen's switch board for lights, fans and heaters, this being separated from the motorman's switchboard and provided with a completely protected front as shown in the accompanying half-tone. In this, each one of the panel doors has a latch so interlocked with the switches that it cannot be opened while any switch in that section is closed. The motorman's switchboard is of the usual type.

Fitting the Electric Locomotive to Its Load*

It Must Be Handled with Due Regard to the Ease with Which
It Can Be Overloaded—Its Performance Can
Be Predicted with Great Accuracy

BY A. H. BABCOCK

Consulting Engineer Southern Pacific Railroad, San Francisco, Cal.

THE limit of engine capacity is the boiler. Because the electric locomotive boiler is stationary, and therefore may be of any size whatever, the electric locomotive has inherently a greater possibility of development to large sizes than the steam locomotive. It is my purpose to indicate the limiting features in these respects and to show how the safe load of an electric locomotive is determined.

Steam railway men have been too busy doing things to have been able to follow the details of development of an art that only recently has touched their work directly. When they do come into contact with this development they are much surprised by the electrical engineer's claims for precision in his computations and the confidence with which he relies on his results; so surprised, in fact, that often they are in some degree skeptical. They have not been accustomed to methods of measurement of the order of precision of those commonly used by the electrical man; hence they are disposed to apply their own determination of engine rating, often with expensive consequences.

When for example, the electrical man tells the steam man that an electrical locomotive is good for thirty cars, and the steam man tries thirty-five cars with no apparent result other than to discredit his information, he keeps on overloading the machine until it breaks down, and then he blames the electrical man for designing a machine that is so unreliable. For these reasons the fundamental principles of determination of locomotive rating will be stated preliminary to developing the methods used in practice.

The effects of overloads on electric locomotives are very different from those produced on the steam engine. An overload on a steam locomotive is simply a load that it cannot pull. An overload on an electric locomotive does not necessarily stop the train or even slow it down. The locomotive keeps going but the motors are burned out. Safe load, then, is the maximum that can be pulled without excessive heating.

Heat is developed by the resistance of the conductors to the flow of current through them, just as the temperature of air or water is raised by pipe friction, and the heat developed in electrical conductors is proportional to the square of the current. If this heat is not led away, the motors "burn up," *i. e.*, the insulation on the conductors first is charred, which destroys its insulating properties, then the coils short-circuit and become grounded, and finally, if the current is not cut off, the motor itself is melted away or even burned up.

It is interesting and perhaps may be illuminating to consider this a little in detail. One of the best illustrations is the heating of the New York subway. Many persons cannot understand why the subway is so oppres-

sively warm. They do not realize that practically all of the energy transmitted into those tunnels appears there as heat, so that, in reality, a very large proportion of the output of the huge electric generators in the powerhouse is actually heating the subway.

Returning to the motors, let us see how these heat losses are disposed of practically. The conductors in which the heat is developed are either buried in the iron or are otherwise entirely surrounded thereby. In the early designs of railway motors, radiation from the motor surface was the sole means employed for the dissipation of the heat. In later designs, by means of fan blades suitably placed on the revolving armatures, air is forced through ducts left in the iron for this purpose. The determination of the loading for any electric locomotive is seen to be not quite so simple as in the case of a steam locomotive. The simplest case is that of a long, constant-speed run without stops and with a fixed load. Variations in gradient and curvature do not complicate the study; as will be seen later they merely add to the detail. The most complicated case is that of a suburban or interurban railway where there are many stops, not necessarily the same from trip to trip, and with varying train consistency from day to day. The study of a situation less complicated than this, the Oakland, Alameda & Berkeley lines, monopolized the attention of an engineer and several computers for many weeks.

ELECTRICAL MEASUREMENTS YIELD ACCURATE ELECTRIFICATION DATA

In general, the question may be viewed from two standpoints: (1) A given traffic is to be handled over a given line under an assumed or stated set of conditions; required, the locomotive specifications. (2) What will a given locomotive haul over a given line under existing operating conditions?

In Case 1 the first step is to compute roughly the general characteristics of the locomotive required to haul a maximum train over the line. If the sizes indicated thereby are unreasonable, then the train must be considered as made up of units that can be handled by one locomotive unit, and as far as the present figures are concerned this becomes the train to be studied. An alternative method is to divide the locomotive into several units and consider the whole train as a unit. In either case and in any event the problem reduces to a question of tons of train per motor.

Usually in any given installation Case 1 combines with Case 2. The simplest problem is to determine the safe load for an actual locomotive upon an existing line. From the manufacturer's or an assumed horsepower rating and the general characteristics of the line, a tentative loading is assumed, and a train is made up to correspond as closely therewith as may be possible.

The electrical engineer then connects a recording in-

*Abstract of paper read before the Pacific Railway Club, Feb 13, 1919.

strument to measure the current taken by the locomotive. A pen attached to the instrument traces a line upon a strip of paper moved by a clock mechanism. This record then shows the current being consumed at every instant during the run, and from the area between the curve and the base line the average current is obtained. But since the heating is proportional to the square of the current, this curve will not give the desired information directly unless it is in circular form. If, however, the current is recorded by motion of the pen along the radius of the circle, since the area of a circle is proportional to the square of the radius, the area between the curve and the center will be proportional to the square of the current, from which by a very simple computation the required measure of the heating may be obtained. If the result so obtained gives a higher value per motor than the root-mean-square current guaranteed by the manufacturer, the locomotive is overloaded. Then by a proper consideration of the "empties" and underloaded equipment in the test train, a loading schedule for that type of locomotive can be specified for that particular run.

PERFORMANCE CAN BE COMPUTED WITH AID OF MANUFACTURER'S CURVES

In cases where the electric service is not yet in operation, and therefore where measurements of the current cannot be made, the currents can be computed with very great accuracy and a similar result reached. The process is as follows: The horizontal effort is determined first. For ordinary freight service reasonable tractive forces per ton of train, including locomotives, are: For acceleration, 10 lb.; for friction, 6 lb.; for grade (for each 1 per cent), 20 lb.; for curvature (for each degree), 0.8 lb.

The engineer's profile is now required, from which to take off the gradients and the curvature. Whenever these change, the horizontal effort per ton of train, derived from the constants given above, is set down against the distance over which the conditions are constant. Reference to the manufacturer's motor curve gives very accurately both the current required over this section and the speed at which the train will run.

It is convenient then to set down these quantities in tabular form, the columns being: (1) Engineer's stations; (2) distance (feet); (3) speed (from curve); (4) time (computed); (5) current squared (from curve).

The sum of the times gives the elapsed time between stations. The values in the "current squared" column plotted, as before, on polar co-ordinate paper, give the heating current. If the value so obtained exceeds that for which the motors are guaranteed a smaller train loading must be assumed and the computations repeated until the safe load is found. The accuracy of these computations is outside the experience of steam railroad men and often strains their credulity.

The worst feature of the whole matter lies in the fact that whereas an overloaded steam locomotive merely fails to get over the line and the crews have many explanations available, an electric locomotive pulls the load and does not lose a great deal of time, but it suffers damage, concealed unfortunately from all but the expert. The damage is real, nevertheless, and the day of reckoning, the day of burned-out motors, is as sure as taxes to follow. Meanwhile when the load has been pulled once, the overloading is continued and the engine failure is brought nearer. In the end the com-

pany pays the bill, and as a rule the real culprit escapes.

The difference between a properly supervised system and the other kind is found in the records of the O., A. & B. lines, and another system which shall be nameless. In the one case, not a single motor has been re-wound due to overload since the service started in 1911, nearly eight years ago. In the other, three times as many armatures as the system owns are re-wound every year, which means, of course, that on the average, every motor lasts only four months.

STEAM ROAD MEN SURPRISED AT ELECTRIC TRAIN PERFORMANCE

When the O., A. & B. installation was being engineered a committee representing the operating construction, maintenance, and motive power officials passed upon all questions of policy. When this committee was asked to consider speeds, station stops, lay-overs, etc., the members could see little use in spending much time on such details. When they were told that these are essentials in the layout of electric train schedules and that the trains would follow their predicted schedules within a few seconds, they hardly took the statement seriously. Later, the official trial train made the round trip from the Mole to Berkeley, with all the stops as scheduled, the gates not being opened but the train being held at every station for the number of seconds specified in the schedule. It reached the Mole within less than ten seconds of the predicted time, and the general manager congratulated us on the "good guess" we had made. Our reply almost made him laugh. It was to the effect that any other result would have justified him in asking for some resignations. The standard of electric operation in these particulars is so much higher than those of steam that in the early days of that service it was difficult to make the operating officials realize that what had been reasonably good performance before is no longer good enough. The operating standards had to be raised, and they were raised.

ARGUMENTS, PRO AND CON, REGARDING CONSTANT-SPEED MOTIVE POWER

The practical operating official will see at once that any system in which the motive power tends to run at constant speed presents some favorable and some unfavorable operating features. One of the disadvantages is lack of ability to make up lost time. But on the other hand the tendency in such a system is not to lose time but to keep strictly to schedule. On all electric systems the dispatcher's duties are much simplified. No longer is he troubled with individual characteristics of engines or engine crews. If the train moves at all it moves on schedule time. On such a system, with operating conditions very closely approximating those of the Sierra of Tehachapi grades, the principal difficulty the engine crew has is to keep awake. After the train is in motion there is nothing to do but to watch for signals. Everyone in the cab, including visitors, is expected to confirm the signal indications when first reported by either of the engine crew.

When I visited this property a few years ago the dispatchers spoke most enthusiastically of the constant speed of the trains, which permits them to count on the arrival of the train at a given point within a fraction of a minute. As a result, any freight train is sent out on the line ahead of any passenger train whose schedule speed is no greater than the running speed of

the freight locomotives, and the passenger train is not held up.

The general superintendent told me that the largest saving was due to a better handling of the traffic, in that lost motion is eliminated. No stops are necessary for water or fuel and to blow up steam; for the trainmen have less grounds for excuses for delays, and there is a general "tuning up" of all hands. And this is

what I meant when I said that the operating standards under electric operation are higher than those under steam operation.

The ability to determine with great precision the proper load for the electrical motive power, and its inherent tendency to a constant speed, make for a regularity of operation difficult for a steam official to realize until it come into his experience.

Single-Phase Locomotives for Swiss Federal Railways*

Two Types of Locomotives Supplied by Swiss Manufacturer for Freight and Passenger Haulage Present Some Interesting Details

THE general electrification of the Swiss Federal Railways was decided upon several years ago. In placing orders for the necessary locomotives, it was originally intended to have these delivered in groups with different types so that their suitability for the conditions encountered could be tested under operating conditions and the results taken into account in subsequent construction. It was later found impossible to follow this program due to the war. Four sample locomotives for the St. Gotthard line, however, were ordered early in 1917, and an order for twenty additional locomotives was placed in 1918. Half of this latter order was placed with Brown, Boveri & Company. Some details of the four sample locomotives, together with some other types developed, were given in the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 7, 1918, page 411. Of the locomotives now under construction by Brown, Boveri & Company, two types are shown in the accompanying illustrations. One of these is an express locomotive, the other a freight locomotive. As both types have the same general principles of mechanical and electrical construction, a description of the express locomotive will serve for both. The express locomotive has two trucks, each provided with one leading and two driving axles. The two trucks are joined by a spring coupling device which provides for transmitting the reciprocating forces direct from one truck to the other, and so improves the general running by relieving the flange pressures of the inner driving wheels at curves.

For transmitting the power from the motor to the driving axles spur gears and coupling rods have been adopted. Each truck is provided with two motors geared to a common intermediate shaft which is connected to the driving wheels by means of the coupling rods. The latter are arranged one on each side of the locomotive with an angular displacement of 90 deg. The pinions on the motor shaft are fitted with springs to give circumferential flexibility. This arrangement was adopted to equalize the tooth pressures on the two pinions and to compensate for the sudden alterations of torque chiefly due to the coupling rod drive with its changing reciprocating forces.

Two strongly constructed center pins supported from

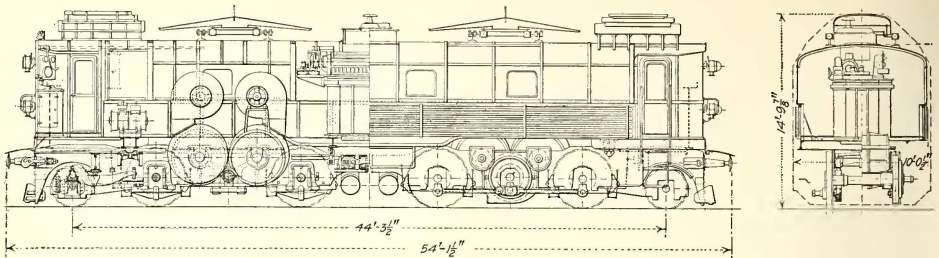
the trucks take the weight of the locomotive body and the electrical equipment. One of these pins is centered in the truck, while the other has sufficient play in a longitudinal direction to insure that the driving forces are taken by the coupling device and cannot be transmitted by the center pin. Two auxiliary supporting points between the truck and frame are arranged just at the inner side of the inmost driving axle. These are necessary to obtain an equal distribution of load on the axles. To insure stability of the frame in the transverse direction, light springs are provided, two placed on the truck frame at the side of each center pin.

The locomotive body is built of sheet iron with suitable heavy stiffening pieces. In order to provide easy access to the driving gear and spur wheels, the lower portion of the body is made in the form of a girder. A driver's cab is provided at each end of the locomotive. All electrical apparatus other than the motors is installed in the body of the locomotive proper. The motors are provided with fans mounted on top and projecting through the floor of the locomotive. This necessitates relatively large openings in the floor, and to prevent the entrance of snow, etc., into the interior of the locomotive these holes are closed by movable cover plates.

Westinghouse brakes of the automatic and regulating type are provided and are arranged so that the brake rod of each truck can be operated by hand. There are four brakeshoes provided for each driving axle, and the leverages are so proportioned that the pressure of all shoes is the same. Compressed air for the brakes, sanding device, whistle, and some of the electrical apparatus, is furnished by two Brown-Boveri air compressors. The total weight of the express locomotive is 237,200 lb., and that of the freight locomotive 266,800 lb. The mechanical portion of the locomotive was designed and constructed by the Swiss Locomotive & Machine Company of Winterthur.

The control switches with their operating apparatus are mounted together with the transformer so that the whole forms a complete unit which can be installed or removed bodily through an opening in the roof. As a result of a thorough investigation into the cooling of transformers under actual running conditions during many years, the manufacturer has installed oil-cooled transformers. The oil is forced by a circulating pump through a system of cooling pipes fitted to the sides of the locomotive. The transformer is designed

*Further details concerning the construction and equipment of these locomotives will be found in an article by J. Buchli, chief engineer locomotive department, Baden Works, Brown, Boveri & Company, in the issues of *Engineering*, London, for May 2 and 9, 1919, from which the illustrations and information for this article have been taken.



EXPRESS LOCOMOTIVE FOR SWISS FEDERAL RAILWAYS

for a continuous output of 1750 kva., the high-tension side being wound for 15,000 volts but adaptable for 7500 volts. The secondary pressure is 1325 volts at no load, and the frequency is 16 $\frac{2}{3}$ cycles per second. The transformer complete with pumps and separate coolers weighs 27,800 lb., and is 7 ft. 1 in. long, 4 ft. 11 in. wide, and 5 ft. 2 in. high to the cover.

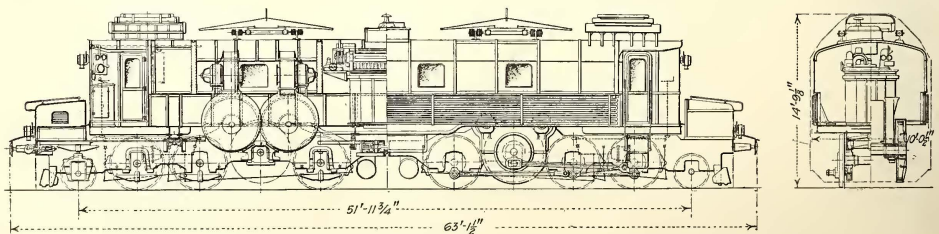
The two motors of each pair are connected in series, while the two pairs are in parallel with one another. The series arrangement is allowable as the mechanical coupling of the two motors insures an equal distribution of the voltage. The series connection was preferred on account of the saving in copper for the connecting cables, as well as in the weight and space due to the current being one-half of that with parallel connection. The motors are ventilated, air being drawn in from the interior of the locomotive and blown out underneath. The motors are of the single-phase, series type with compensating winding and commutating fields with phase displacement. There are twelve brush-holders to each commutator with a total of twenty-four brushes each, 2 $\frac{1}{2}$ in. broad and $\frac{3}{4}$ in. thick. Between the armature conductors and the commutator there are resistance connections. For regulating and altering the voltage supplied to the motor, the low-tension winding of the transformer has nineteen tappings; one of these, however, being a ground connection. The voltage increases per step are not always the same, these being smaller at the middle than at the end tapping. This arrangement of regulation was adopted so that when the limit of adhesion between the wheels and rails was reached, a finer regulation in the tractive effort can be made.

The leads are brought out through the transformer cover direct to the tapping switch. This latter apparatus differs considerably from the type usually adopted for this purpose. It consists of two cell-type switches used in conjunction with storage batteries but combined

so as to form a single unit. This tapping switch, as well as the other control apparatus, is operated by direct-current motors. A small motor-generator in conjunction with the storage battery supplies the necessary current. The control is of a multiple-unit type so that two locomotives can be operated from a single cap.

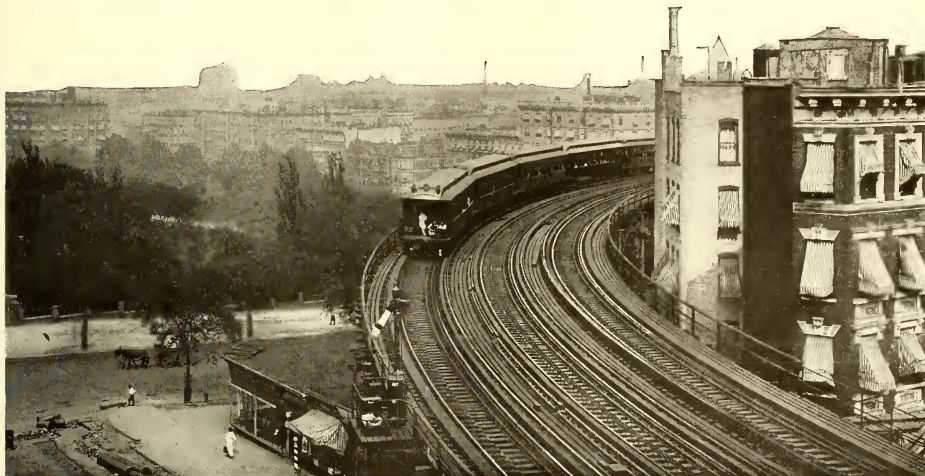
The railway authorities insisted that each locomotive be provided with an electric brake. This was specified to avoid the dust produced at the wheels of the locomotive and to lessen the wear on tires and brakeshoes. The fine iron dust produced in large quantities during braking finds its way into the interior of locomotives, especially when assisted by the suction of the motor fan. Here it is deposited on the windings of the apparatus and in the motors, thus giving rise to trouble and insulation breakdowns. Very steep gradients are encountered on the Bernese Alpine Railway, and the quantity of dust produced from braking amounts to as much as 40 tons per year. On some of the locomotives still on order, it is proposed to use an improved system of electric braking so that power may be returned to the line.

The following service requirements are specified for these locomotives: Express locomotives must be able to haul a net load of 300 tons at a speed of 31 m.p.h. on a gradient of 2.6 per cent, while the freight locomotive, in addition to having a speed of 31 m.p.h. under the same conditions, must reach 21 $\frac{1}{2}$ m.p.h. with a net load of 430 tons. It is further specified that both trains must be able to be started from rest to full speed in four minutes on the same gradient. The overload demanded is 20 per cent for fifteen minutes at a time. The normal full-load conditions represent an output of 4500 hp. (one-hour rating) per locomotive at the motor shaft, with a tractive effort of 27,500 lb. and 37,500 lb., respectively, at the circumference of the driving wheels. These amounts are increased to 35,500 lb. and 48,500 lb. during starting on an upgrade.



FREIGHT LOCOMOTIVE FOR USE ON SWISS FEDERAL RAILWAYS

Types of Third-Rail Used in Railway Electrification



EVEN ON SHORT RADIUS CURVES THE THIRD-RAIL PROVIDES A RELIABLE POWER CONNECTION

The Leading Types of Third-Rail Construction Now Used Are Discussed, Their Important Features Are Considered and Their Advantages and Disadvantages Are Compared

TO CONNECT the stationary electric power generating and distributing system with a moving car or train which uses this power it is necessary to provide a contact system. Such a system consists of two parts, the stationary or distributing part and the moving collecting device. In order to keep the parts out of the way and for safety early systems used an overhead construction for this distributing device. As cars became heavier and the speeds at which they were operated were increased, heavier duties were placed on the connecting system. This required a continuous conductor of larger section and what is now commonly known as the third-rail construction was resorted to. To the railway man the handiest form of a large section conductor was the ordinary T-rail. At first, attempts were made to use this as a continuous conductor, and a gravity contact device was adopted which slid on the head of the rail.

THIRD RAIL DESIGN FOR ELECTRIFICATION

In considering the design of a steel rail to act as a conductor and at the same time to give a good contact surface for the collection of current by a moving train several important features must be considered. A review of some of the designs which have been used and a comparison of the advantages of the respective types are given in this article.

Third-rail installations may be divided, roughly, into

three classifications as to their point of contact with the collecting device, namely, over-running contact, under-running contact, and side contact. The earliest installations were over-running or top contact in which the collecting device passed over and made contact with the open top of the third-rail. The first installation used a form of collector which depended on its own weight for contact with the third-rail, and the installation was exceedingly simple. These first installations were on elevated systems where there was little or no danger of the public coming in contact with the rail. Later, when the use of the third-rail contact system was taken up by interurban roads and for steam road electrification where there were possibilities of accident to the public from coming in contact with a bare conductor, it became necessary to devise some better means for protecting the rail. This led to several types of protected third-rail, and later to the under-running and side-contact construction. In the accompanying illustrations examples of each of these types are given.

In considering the points of merit in the various designs it is advisable to classify the leading features necessary for the development of a sound, practical type of construction. The points to be considered may be classified as follows:

1. Rail section, selected with respect to: (a) Ease of obtaining, (b) ease of handling, (c) danger of damage, (d) conductivity, (e) ease of attaching protec-

tion, bonds, anchors, etc., (f) sufficiency of wearing face.

2. Location, determined by: (a) Small space desirable, (b) special work construction, (c) creepage distance to ground, (d) limitation of trouble from derailing, (e) clearance.

3. Protective covering, designed to: (a) Prevent contact, (b) protect against weather.

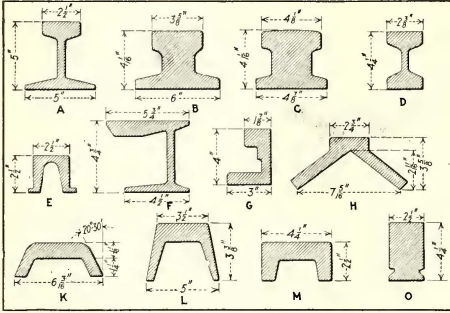


FIG. 1—DIFFERENT THIRD-RAIL SECTIONS

4. Ease of installation and maintenance, with respect to: (a) Necessity for special ties, (b) expensiveness of cable work involved, (c) provision for gaps in third-rail, (d) rebalasting and tamping required, (e) interference with signal system.

THIRD-RAIL SECTIONS HAVE INCREASED IN WEIGHT

The first type of third-rail used was a standard T-section, adopted principally because it was most readily available at the time. Since then this standard section has been used extensively in various weights from 40 to 150 lb. per yard and probably most of the third-rail lines in operation to-day still use this type. The lighter weights were used extensively in the first installations, but were found to be not as satisfactory as the heavier rail. They have been practically abandoned except for use in yards where high conductance is not necessary.

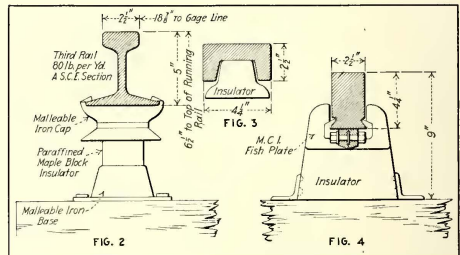
Conductivity depends on the hardness of the rail, and the importance of conductivity varies with individual ideas of the designers. Generally speaking, the resistivity of third-rail is from six and one-half to eight times that of copper. The third-rail steel is considerably softer than the material used for track rails which has a resistivity of from eleven to twelve times that of copper. The principal reason for the large variation in ideas as to the proper conductivity for third-rails, is due to the question of maintenance economy. The life of the rail decreases as conductivity is increased. Furthermore, it is necessary to use more care in handling a soft rail than a hard one. The advantages and disadvantages of each quality must, therefore, be balanced against each other to determine the best one for a particular case.

From observation of the life and resistance of existing installations it has been found that some rails flake away in large pieces, so that the track is strewn with sheets of rust. This tends to reduce the conductance of the rail and also causes short-circuits on the line. While it would seem that painting or weather-

proofing of third-rail would prevent this trouble, it has not been generally resorted to, although trial installations have been made. While it is reported that painting effectively deters corrosion, still it does not appear to be generally favored, due to its increased cost and also to the difficulty in handling painted rail without damaging the paint.

The great advantage of the heavy rails lies in their increased conductance which tends to render unnecessary a paralleling feeder system. The length of rail used affects the labor of handling and the number of bonds necessary to a large extent. The present practice of bonding presents no particular difficulty where third-rails are properly supported and anchored. There has been a great deal of experimental work conducted with new and original sections for use as third-rail. The chief two considerations which led to these were (1) to produce a section which had a greater contact surface in proportion to its weight than the ordinary T-rail, thus giving a greater wearing surface and longer life, and (2) to obtain a section which could be more easily supported and which would provide greater facility for bonding, anchoring, insulating, etc., than the ordinary T-rail.

A number of third-rail sections in use are shown in Fig. 1. The section shown at A is the 80-lb. standard T-rail section commonly used. B is a special section used by the Long Island Railroad and C is a similar section used by the New York Municipal Railway. All of these three are used for over-running contact. Sections B and C are of the same weight, but C has the advantage of greater contact surface. The section shown at D is that used by the New York Central Railroad on rails with under-running contact. It was designed to provide a better support for this type of construction than was available with the standard T-section. Section E is that of the Philadelphia & Western Rail-



OVER-RUNNING UNPROTECTED THIRD-RAIL CONSTRUCTION

Fig. 2—Standard T-rail type. Fig. 3—Wide-contact design. Fig. 4—Compact construction.

way, which was originally designed as an under-running rail, but has since been inverted, a change which was found necessary to meet local conditions. The section shown was selected by the railway's engineers because of their belief that it would reduce the first cost and maintenance, eliminate leakage losses, increase the clearance and provide for automatic operation of the shoes.

Section F is a recent under-running type of rail used by the Central Argentine Railway and G is the section used by the Lancashire & Yorkshire Railway with the side contact system. The remaining sections

shown are special types for over-running third-rail, and special shapes brought out to provide a more satisfactory means for supporting these sections and also for supporting a protective covering.

INSULATION FROM RAIL TO EARTH

A long insulator leakage path to ground is found necessary to prevent the current leaking across and burning during wet weather. This problem, however, has presented no formidable obstacle. The insulator must allow a longitudinal movement of the rail for expansion and contraction but must hold it securely against lateral motion. The vibration set up by heavy cars in some cases has produced strains sufficient to crack the insulators. Good results have been produced by interposing a shock-absorbing material, such as felt or canvas, between the cap and the insulator and allowing for vertical movement of the third-rail.

For voltages higher than 700, porcelain insulators have proved most satisfactory and these are now being generally used for all third-rail construction. These are provided with a lip or petticoat so that the insulators will be washed by the rain, and all metal parts are reduced to a minimum to obtain as much creepage surface as possible. In practice it has been found quite unnecessary to have heavy caps and bases cemented upon the insulators. These include waste metal and act as an additional element of danger. The first design included lugs on insulators to prevent the conductor rail from moving up and down. This type of construction is shown in Figs. 2 and 5. The lugs were found to be needless and in fact proved disadvantageous, causing breakage of the insulators. They also add to the difficulty of installation of the rail. The latest type of construction includes vertical lugs of such a height that the depression of the ties with passing traffic will still leave the lugs high enough to prevent the dislodgement of the conductor rail.

The several designs of third-rail construction illustrated permit the making of some comparisons of the desirable features as enumerated on page 1142. Without considering the questions of cost of installation and maintenance but having in mind the practical advantages of the various designs presented, it is possible to obtain some idea of the improvements made and their value in actual service. From the illustrations shown it will be seen that there is a considerable variety in use. Very little attention has been given to possible standardization, and the amount and importance of this consideration is bound to vary with individual ideas.

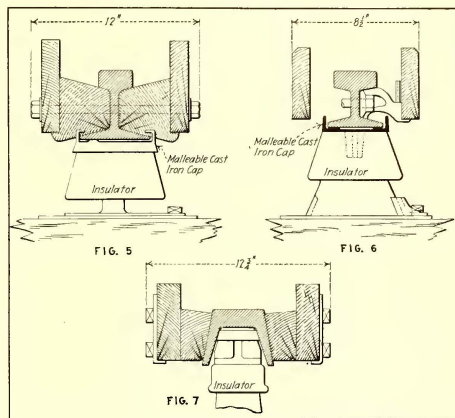
COMPARISON OF TYPES OF THIRD-RAIL CONSTRUCTION

The designs shown in Figs. 2, 3 and 4 are the unprotected over-running types. In the first of these a standard rail section is used which admits of easy bonding and connecting up. The section shown in Fig. 2 presents a wide contact surface and at the same time exposes a large unprotected surface. It has been used unprotected owing to special construction of bridges and track when a shallow rail is necessary to obtain sufficient clearance to earth and to insure the required clearances. It cannot be considered seriously for extensive railway electrification when compared with other designs. It fails in the essentials of the amount of space occupied and the distance from rail to earth, and the section does not permit of the easy attaching of bonds and anchors. The arrangement shown in Fig. 3

is a very compact section and has many advantages, but the drilling of bond holes through $2\frac{1}{2}$ in. of metal, as is necessary with this design, is a decided disadvantage. There is also a tendency for this type of rail to "whip" and become top-heavy. As all of these types are unprotected they are suitable for use only on elevated railroads or on roads with private right-of-way.

The designs shown in Figs. 5, 6 and 7 are for over-running contact and have side protecting boards to afford safety against inadvertent contact.

Fig. 5 shows a type of construction which provides for the use of the standard section of third-rail and



OVER-RUNNING, SIDE-PROTECTED TYPE OF CONSTRUCTION

Fig. 5—Sides bolted to conductor. Fig. 6—Sides supported by brackets. Fig. 7—Inverted "U" section.

has the advantages already enumerated for this type. The disadvantages of this design are the large amount of space occupied and the wide opening through which the conductor rail is exposed. The protection afforded is not so great as would be desired for many installations, especially where there are severe weather conditions of sleet and snow.

The design shown in Fig. 6 is a considerable improvement over the preceding. The space occupied laterally is $3\frac{1}{2}$ in. less and at the same time a good contact surface is provided. It has greater clearance to earth and excellent provision for mechanical attachments. The cap is of light dimensions and the lugs are of the latest design. A disadvantage is that insufficient protection is provided against sleet and snow. In the design shown in Fig. 7 a special section is employed. The space occupied is large and the surface is exposed more than is desirable. In this type also the insulator is covered up, which is a most undesirable feature as it allows the accumulation and baking of dirt which might cause short-circuits.

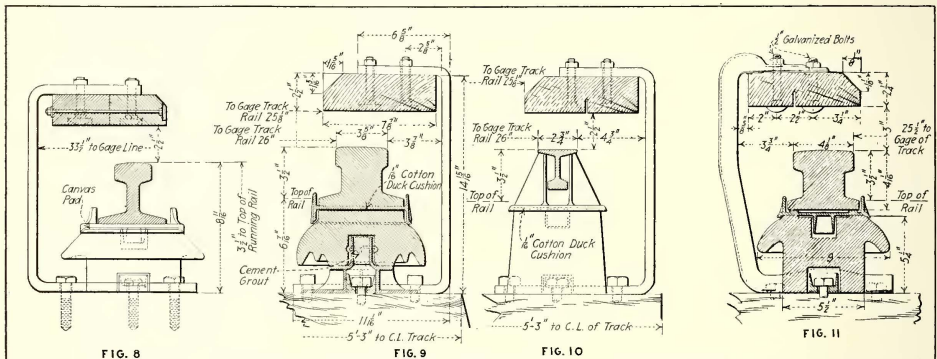
The types of construction shown in Figs. 8, 9, 10 and 11 have been developed with especial reference to providing an efficient protective covering against severe weather conditions and they also provide protection against contact. That shown in Fig. 8 is the new, protected, over-running T-rail type used on the main lines of the Philadelphia & Western Railway. The

clearance provided for this type of construction is well within the clearance lines specified by the American Electric Railway Association and the American Railway Association.

The rail shown in Fig. 9 is that used by the Pennsylvania and Long Island Railroads. The cost of maintenance with this has been found to be exceedingly low and this type has the important virtues of having simple parts, providing flexibility and ease of maintenance and installation. It can easily be repaired in cases of derailment. All clearances conform with the standard of the American Railway Association. The rail section used is extremely heavy, 150 lb. per yard. A special chemical composition is used which is low in carbon and other hardeners, and gives a resistivity about eight times that of copper instead of about twelve times as is the case with the ordinary track rail. This heavy section was adopted on account of the very heavy currents used for individual trains where the traffic is exceedingly dense, which required a large current-car-

quite similar to the Pennsylvania Railroad construction but employs a different type of supporting bracket and different insulators and third-rail section. The weight of the section is the same as that used by the Pennsylvania Railroad but a larger contact surface has been obtained by reducing the supporting surface somewhat. The construction shown in Fig. 11 is the standard type used on the majority of the New York Municipal lines, and that shown in Fig. 12 is a special type which was made necessary due to small clearances and tunnel construction. In the latter the supporting bracket has been rounded at the base to provide clearance with the lining of the tunnel, and the insulator is 2 in. less in height than the standard insulator.

Another type of construction with the overhead protecting board in which a special third-rail section is used is shown in Fig. 13. This is used on branch lines of the Philadelphia & Western Railway where the original contact rail was reversed. The original



OVER-RUNNING, TOP-COVERED TYPE OF THIRD-RAIL

Fig. 8—T-rail on main lines of Philadelphia & Western. Fig. 9—Pennsylvania type for tunnel section. Fig. 10—Pennsylvania type for yard track. Fig. 11—New York municipal standard.

rying capacity and high conductance in the collector system.

In yards where the large section of third-rail is not needed for conductance and where it is necessary to have the maximum of clearance for signal and other apparatus along the track, a standard T-rail section has been adopted. This is shown in Fig. 10 and consists of a section of 25-lb. standard Bessemer T-rail mounted in an inverted position. The base of the rail constitutes the contact surface.

The heavy-section rail is bonded with ribbon type compressed-terminal foot bonds, four to a joint, having a conductance equivalent to 80 per cent of that of the third-rail. The light-section rail for the yards is bonded with the protected-type pin-terminal cable bonds. The protective covering in both cases consists of a continuous plank carried on wrought-iron brackets secured to the third-rail ties, which are longer than the standard ties. On the open line this plank is of yellow pine but in their tunnel construction they use Jarrah wood imported from Australia. This is used on account of its slow-burning qualities.

The type of construction shown in Figs. 11 and 12 is that used by the New York Municipal Railway Corporation for its rapid transit subway service. This is

type, of under-running construction, is shown in Fig. 15. All clearances are well within that adopted by the American Railway Association.

Three types of under-running-contact, protected-type third-rail are shown in Figs. 14, 15 and 16. In Fig. 14 is one used by the New York Central Railroad Company and by the Philadelphia Rapid Transit Company. By inversion of the rail its protection on both top and sides was made a comparatively easy matter and the bottom was left clear for contact with the collecting device. This construction is somewhat more costly than the over-running type on account of the types of insulators which must be used. These are mounted in cast-iron brackets bolted or lagged to long ties, which must be high enough to hold an insulator below which the third-rail is suspended. They must be rigid enough to bear the weight on them without excessive vibration and on account of their shape this requires a somewhat heavy section. The board protection is supported on these brackets or upon the third-rail itself. This under-running type of third-rail has the decided advantage of being self-cleaning in stormy weather and is operated without trouble even when the rail is deeply covered with snow.

The design shown in Fig. 15 is the under-running

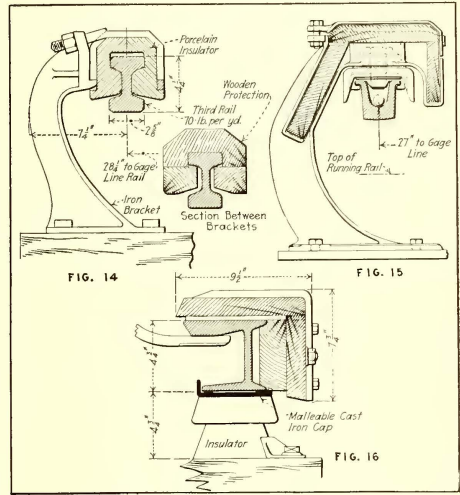
type formerly used by the Philadelphia & Western Railway, as previously stated. This type of construction was changed to that shown in Fig. 13 as it was found possible to design the top-contact third-rail at a much lower cost. Experience with this type showed that, while it provided for longitudinal movement due to expansion and contraction, no provision had been made for movement in a vertical plane. The vibration set up by the heavy cars brought such enormous strains upon the insulators that in many places the only insulation left was that afforded by the tie. Furthermore, it was found very difficult to locate defective insulators. The clearances did not come within the standard adopted by the American Railway Association and it was desirable that this be changed so as to conform thereto.

The design shown in Fig. 16 is the most recent type of under-running contact rail used by the Central Argentine Railway on its line from Buenos Aires to Tigre. The third-rail voltage is 800. The advantages claimed for this type of construction are compactness, protected surface, good insulation and safety. The practical advantages in the use of this rail have been demonstrated under most severe conditions and have given most satisfactory results. The section of third-rail employed is special for this particular type of construction.

HIGH-VOLTAGE DESIGNS

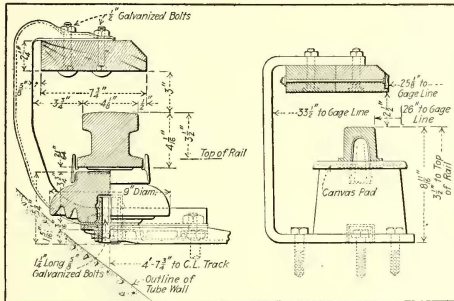
Before leaving this subject of third-rail installation it is important to examine some of the designs which have been used on systems using a higher voltage than 600. That shown in Fig. 17 is a side-contact type successfully used by the Lancashire & Yorkshire Railway between Manchester and Bury, England. This rail is

Yorkshire type of third-rail construction to be particularly well adapted for conditions in Great Britain. Various lines there have trestles and tunnels which limit the space available at the side of the track and this type of construction sets in close to the track and can be more readily installed than some other types. It



UNDER-RUNNING, PROTECTED TYPE OF THIRD-RAIL CONSTRUCTION

Fig. 14—New York Central type. Fig. 15—Philadelphia & Western old type. Fig. 16—Special type used abroad.



FIGS. 12 AND 13—BRACKET-SUPPORTED TOP-COVERED TYPES

electrified at 1200 volts and there is complete protection to the conductor rail. There are, furthermore, no metal parts or attachments connected to the conductor rail, all supports for protection being provided by means of clamps. The wooden key shown at A is used for clamping up the sides of the protection. A space shown at B is left for drainage. This design has a large range of adaptability and is eminently simple in construction.

In speaking of the various types of third-rail construction Alfred Raworth, electrical engineer for the South-Eastern & Chatham Railway of England, who spent considerable time in this country studying American practice, said that he considered the Lancashire &

would appear, however, that under such climatic conditions as exist in the northern part of the United States more difficulty would be experienced in the winter months with the collection of snow and ice in this slot than is the case with some of the other types of construction already described.

The arrangement shown in Fig. 18 shows a suggested type of third-rail support and protection suitable for high-voltage operation of which a description was published in the March 6, 1915, issue of the ELECTRICAL RAILWAY JOURNAL, page 469. Porcelain insulators held in place by U-shaped pieces of flat strap iron are used. These insulators also serve as the supports for the protection proper, which is simply an inverted trough. The design permits of rapid and cheap erection and at the same time provides high insulating qualities.

Special interest attaches to the third-rail construction of the Michigan Railway shown in Fig. 19, because it was the first to be installed for a voltage of 2400. An 80-lb. T-rail section of low-carbon steel especially rolled for this road is used. The specifications provide for carbon not over 0.14 per cent, manganese not over 0.40 per cent, sulphur not over 0.08 per cent and phosphorus not over 0.11 per cent. The rail is guaranteed to have a conductivity one-eighth that of copper. The contact rail is carried on a three-peticoat insulator, which in turn rests on the 10-ft. track ties. The method of supporting the protection board is unique and well designed. Here again there is a top-running system with a wooden trough 12 in. wide, with the live rail exposed in the center.

On continuous stretches of 1 mile or less in length the Michigan Railway third-rail is laid with expansion joints one and one-half times as wide as those allowed in standard track joints. Where the stretch of the third-rail is more than 1 mile long, twice the standard track expansion is provided at joints. The petticoat type insulators are tested at 5000 volts and are held in place on the ties by square malleable lugs fastened with lag screws and fitted into recesses in the insulator bases. Third-rail joints are bonded with 7-in. 500,000-

use of third-rail. This is obvious since repairs cannot be carried out with the same facility. Therefore the additional cost of upkeep might justly counter-balance the interest on the extra capital expenditure on overhead construction.

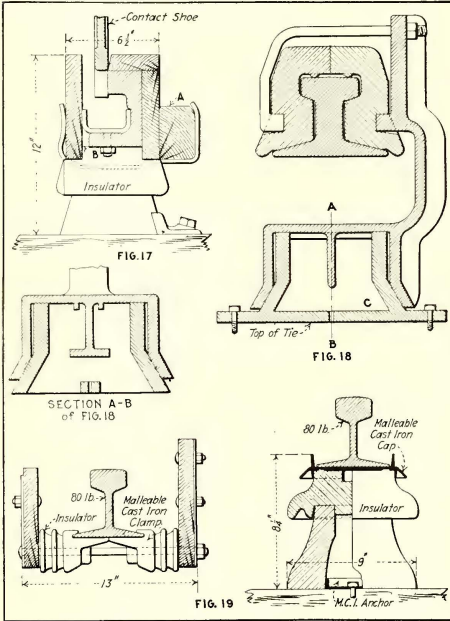
Hardening Rail Joints on Southern Pacific Electrified Division at Oakland

THE usual battering of receiving rail ends at joints on the electrified divisions of the Southern Pacific Railroad at Oakland, Cal., drew attention to the advantage there would be in some means of hardening the heads of the rails at joints. Contract was accordingly made with a San Francisco firm for applying heat treatment to the 1200 joints, approximately, on the Ellsworth line by way of an experiment. The rails on this line are standard 90-lb. A. R. A. It was decided to treat the rail head for a distance of 8 in. from the joint each way. The hardening system used is one which has been employed quite extensively by electric railway companies on the Pacific Coast. It is based on the theory that iron or steel, when brought to a high temperature, will absorb the carbon and other elements necessary to hardening if solutions of salt, sulphate of copper, and potassium are applied to the surface in the presence of a hot gas with a high carbon content. The tempering is affected by chilling the rail suddenly with water. An account of the application of the process to track of the United Railroads of San Francisco was published on page 704 of the issue of this paper for Oct. 19, 1918. The Ellsworth line, to which the Southern Pacific engineers decided to apply it has a twenty-minute service all day and the rails had to be treated between the passing cars.

After the work had been in progress for about three weeks the division engineer inspected 565 treated joints. Of these twenty-four were found to be slightly chipped and six badly chipped although not so seriously as to condemn them. It is believed that when properly applied this treatment, will double rail life. The hardening process has the advantage of being applicable to rails or to special work which has been repaired or which had been built up with new metal by means of a welding process.

If further experience with this process bears out the present opinion, a very material saving in first cost and maintenance of track is expected. Its application is attractive on the Pacific Coast particularly because of the freight and delay incidental to the delivery of manganese special work there. During the war the Southern Pacific Company figured it would be cheaper to use common steel crossings built up at the Sacramento shops in place of manganese crossings even if it should be found that the former had to be renewed every year. Common steel crossings hardened by the heat treatment process are reported to have given excellent service.

The Imperial Government Railways, Japan, are reported as about to make a trial of wireless telegraph communication to its railway trains. Accidents on the railway have previously been made known to the locomotive engineer by flags or other signals, and these have sometimes failed to give proper warning. It is thought that the use of wireless communication will add a measure of safety. Certain railway stations will be selected as wireless stations.



SOME HIGH-VOLTAGE TYPES OF THIRD-RAIL CONSTRUCTION

Fig. 17—Side contact system. Fig. 18—High-voltage third-rail support. Fig. 19—Michigan 2400-volt line; at left, third-rail mounting; at right, protection board supports.

circ.mil bonds of the copper-ribbon compressed-terminal type.

In deciding upon any particular type of conducting system the cost of maintenance, operation and efficiency must all be taken into consideration. The cost of third-rail construction is considerably below that of overhead construction, yet conditions may be such that the advantages of overhead construction are of sufficient importance more than to justify the additional expenditure. Some roads may present ideal conditions for overhead work and considerably reduce the cost of erection, but at the same time expensive alterations for the safe installation of third rail may be involved, materially minimizing the difference in cost and give the advantage in favor of overhead work. Of course, having the track free from live rail with the line accessible at all times is a great point in favor of overhead work and is much appreciated by those whose business it is to maintain the permanent way. The important item of maintenance of track will be increased owing to the



FREIGHT HAULAGE WITH A SELF-PROPELLED MOTOR CAR

Branch Line Operation with Self-Propelled Motor Cars

Results Obtained in Operating a Gasoline-Electric Car on the Minnesota Northwestern Railway for the Last Four Years Are Given, Together with an Account of the Service Rendered

By H. W. PROTZELER

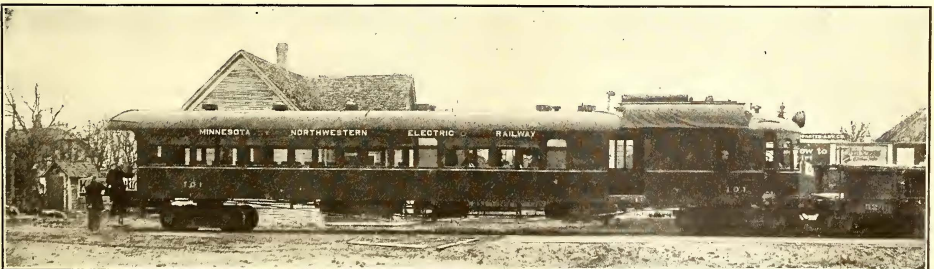
General Manager Minnesota Northwestern Electric Railway

THE economical operation of the large trunk lines of railroads in this country depends to a large extent upon making the branch lines or feeders self-supporting. These branch lines must be made to pay their operating expenses and fixed charges from their own gross revenue, thus relieving the main lines of their burden of support. A very large number of them are now being operated with the cast-off equipment of the main lines, and practically every one of them is daily piling up deficits. To reduce or wipe out these deficits, they should have more economical and efficient equipment.

The need for self-propelled motor cars as adjuncts to the regular equipments of steam railroads has been apparent for many years. These cars provide a clean, quick and attractive service and are capable of being

operated by the minimum amount of labor. However, there has always been an impression in the minds of most railroad officials that the self-propelled motor car is a piece of equipment that has to "puff and snort" pretty hard in order to drag its own weight over the rails and that when any real work is to be done it is necessary to rely on steam equipment. Actual results show that the self-propelled car will handle all of the passenger, express and freight business that is usually met with on the branch lines and do it at a cost far below the amount that is now being spent for the operation of steam equipment.

The Minnesota Northwestern Electric Railway has been operated since August, 1914, by means of a gas-electric self-propelled motor car. One car of the type shown and described has successfully handled all of the



GASOLINE-ELECTRIC MOTOR CAR ON MINNESOTA NORTHWESTERN ELECTRIC RAILWAY

business. The data shown are an average for four years' operation. The cost figures are necessarily higher than would have obtained a few years ago. The cost of operation per car-mile also includes the haulage of a considerable amount of freight.

The line of the Minnesota Northwestern runs a distance of 20 miles from Thief River Falls, Minn., a town of 6000 inhabitants, to Goodridge, Minn., a town of 500. When the line was originally planned the intention was to construct 20 miles each year, but these plans were frustrated by the war. At Thief River Falls there are connections with the Minneapolis, St. Paul & Sault Ste. Marie Railway and the Great Northern Railway. The passenger and freight depot of the Soo Line is used for the Thief River Falls terminus of this line. The entire territory that the line runs through is a partially developed agricultural section that twelve years ago was Indian reservation. All of the business obtained along the line is from agricultural products or products manufactured for consumption in the district. The line runs through open prairie country, so that the grade was made entirely by means of side borrow work. The borrow pits were made continuous in the form of ditches for thoroughly draining the right-of-way. The roadbed consists of 72 lb. per yard steel rails laid on 6-in. x 8-in. tamarack ties, spaced eighteen to the 30-ft. rail. The line is gravel ballasted practically the entire length. The maximum gradient is 0.3 per cent and the maximum curvature is 6 deg.

EQUIPMENT IS GASOLINE-ELECTRIC

The type of equipment used is a gasoline-electric motor car, manufactured by the General Electric Company, of Erie, Pa., and designated Type RE-70-B-11, of the following general dimensions:

Length over bumpers	70 ft. 11 in.
Length of passenger compartment	30 ft. 5 in.
Length of smoking compartment	12 ft. 5 in.
Length of baggage compartment	10 ft. 11 in.
Length of engine compartment	11 ft. 11 in.
Distance between bolster centers	53 ft. 7 in.
Total wheelbase	60 ft. 0 in.
Net weight of car	52 tons
Drawbars	Front, $\frac{1}{2}$ M.C.B.; rear, full M.C.B.
Width over all	10 ft. 6 in.
Height above rail	14 ft. 7 in.
Journals	5 $\frac{1}{2}$ x 10 in. and 5 x 9 in.

The frame of the car is constructed entirely of steel, suitably cross-braced with I-beams and channels. The outside sheathing is of steel plates. The floor is made up in three layers of steel, wood and felt. The interior trim is of mahogany with a composite ceiling. The windows are fitted with plate glass and can be opened to a height of 2 ft. The seats are of the bench type with spring backs and seats, heavily upholstered in plush in the main compartment and leather in the smoker. The seats are wide enough to accommodate three passengers comfortably. The interior of the car is brilliantly illuminated by means of incandescent lamps. The heating is by means of hot water furnished from a Peter Smith heater in the baggage compartment. The seating capacity is ninety-one.

Energy is transmitted from the gas engine to the driving wheels by means of electric drive. The power plant consists of an eight-cylinder, 550-r.p.m., 4-cycle gas engine of the "V" type, rated at 200 hp., direct connected to a 600-volt generator of 80-kw. capacity, but which is capable of very large overloads for short periods. The generator supplies power to two Type GE-205 railway motors of 100 hp. each, mounted on the



OPERATING CAB OF THE MOTOR CAR

headlights. The auxiliary compressor is used for starting the engine by means of compressed air. The brakes are General Electric straight and automatic with a 14-in. brake cylinder.

BOTH PASSENGER AND FREIGHT SERVICE IS MAINTAINED

At the present time two trains daily in each direction are operated, one train in each direction being a passenger train only and one train in each direction a mixed train. The running time of the passenger trains is fifty minutes and the mixed trains sixty minutes. There are three regular stations in the 20 miles, although stops for passengers are made at each mile, on signal. The train crew consists of one engineer and one conductor, who do all of the work necessary to the handling of the mail, express and freight business in addition to the regular work of collecting fares and tickets.

The performance of the motor car in passenger service only, based on operation over track of ordinarily good construction, with the distance between stops as shown and figuring the average duration of stops as thirty seconds, is shown in Table I. This table is based on a motor gearing of a seventeen-tooth pinion

TABLE I—PERFORMANCE OF CAR IN PASSENGER SERVICE

Average distance between stops Per Cent Grade	Schedule Speed in Miles per Hour				
	1 Mile	2 Miles	3 Miles	5 Miles	Free Running Speed
Level	20.5	28.0	32.0	37.0	49.0
0.50	19.0	25.0	28.0	31.0	41.0
1.00	17.5	22.0	24.0	26.0	31.5
1.50	15.5	18.0	20.0	21.0	23.5
2.00	13.5	15.0	16.0	17.0	18.5



STATION AT THIEF RIVER FALLS, MINNESOTA

TABLE II—PERFORMANCE OF CAR IN MIXED PASSENGER AND FREIGHT SERVICE

Total Train Tonnage	Schedule Speed, Miles per Hour		Schedule Speed No Stops	
	52	42.0	49.0	40.0
100	26.0	20.0	40.0	30.0
150	22.0	16.0	20.0	17.0
200	16.0	14.0	15.0	
250	14.0			
300	12.0			

* For periods not to exceed fifteen minutes this car will pull a maximum trailing load of 500 tons.

TABLE IV—OPERATING RESULTS OF THE MINNESOTA NORTHWESTERN

Year	1915	1916	1917	1918	Total
Motor car-miles	36,363	32,633	26,893	26,612	122,501
Number freight cars hauled	1,610	1,268	1,436	1,864	6,198
Freight-car miles	27,305	21,410	24,605	31,596	104,916
Revenue passengers carried	36,045	31,243	29,176	26,790	123,254
Revenue freight hauled (tons)	17,416	15,668	15,470	19,864	66,358
Fuel consumption (gallons)	22,970	21,832	18,033	18,756	81,591
Lubricants (gallons)	473	356	542	322	1,693
Motorcar miles per gallon of fuel	1.58	1.50	1.49	1.42	

and fifty-eight-tooth gear. Higher schedule speeds may be obtained by change of gearing. The speeds given in the table are for average gradients of the amount shown.

Table II shows the performance of the motor car in mixed passenger and freight service, as determined from actual conditions on this line. This table is based on service with stops of five minutes each every 5 miles and for continuous runs of not exceeding 50 miles. Where the runs are longer, stops must be longer, when heavy trains are pulled, in order to prevent overheating of motors and generator. The table is also based on the same gearing as shown in Table I and on level track.

Reliability is one of the prime requisites for railroad operation. The gas-electric motor car possesses this in marked degree. With ordinary care during layover periods, and the chances provided for making minor repairs by the fact that the majority of the branch lines do not operate on Sunday, we have found it is necessary to overhaul this type of equipment only every two years. Table III shows the service rendered during the past four years.

Table IV shows that this type of motor car can be relied upon to handle all of the business (both passenger and freight) that usually is found upon branch lines.

The data shown in Table V on cost of operation are based on gasoline at 17 cents per gallon, lubricating oil at 42 cents per gallon, wages of engineer at \$160 per month, wages of conductor at \$85 per month and carhouse employees at \$75 per month. All of these figures are the average paid by this company during the past four years of operation. The costs given embrace all of the expenses directly chargeable to motor car operation, but do not include any depreciation or interest. The figures are for operation of both passenger and freight service. Where the motor car is used for passenger service only the cost is considerably less. Or if the mileage operated is greater the figures per car-mile are less. This is based on an average of 90 miles per day.

For branch lines of approximately 100 miles, the ideal equipment for economical operation is light-weight motor cars of not exceeding 25 tons, with baggage compartment, capable of seating at least sixty passengers and of making a schedule speed of 35 m.p.h. Such cars would take care of all of the passenger requirements usually met with, especially if the power provided was sufficient to haul one light-weight trailer. These

TABLE III—DATA REGARDING SERVICE AND OPERATING DELAYS OVER A FOUR-YEAR PERIOD

Year	1915	1916	1917	1918	Total
Days in service	311	318	312	314	1,255
Days out of service (overhaul)	6	0	8	0	14
Car-hours in service	3,420	2,994	2,405	2,490	11,309
Delays due to equipment failure	3	2	1	1	7
Duration of above delays in hours (total)	4	3	1	2	10

TABLE V—COST OF OPERATING AND MAINTAINING A GASOLINE-ELECTRIC CAR

Item	Cost Per Year	Cost Per Car-Mile
Maintenance of car body and trucks	\$89.50	\$0.00292
Maintenance of electric equipment	98.40	.00321
Maintenance of gas engines	45.07	.00147
Other power supplies and expenses	79.99	.00268
Fuel for power	3,386.86	.11059
Lubricants	175.26	.00572
Wages, engineer and trainmen	2,950.00	.09632
Carhouse employees and expenses	1,266.62	.04130
Total	\$8,041.66	\$0.26251

motor cars could be operated at a maximum of 15 cents per train-mile.

For the freight service the ideal equipment would be crude oil locomotives capable of hauling trains of 500 to 800 tons at a speed of 20 to 25 m.p.h. The cost of operating this type of equipment would be less than half of that required for steam operation, as all expenses for fuel, etc., cease as soon as the engine stops. Also they are capable of storing fuel for runs of 250 to 500 miles without replenishing. They need no water or fuel stations along the line.

Kilowatt-hours in February

The United States Geological Survey has been conducting a census of energy production on returns received from 3150 electric power plants engaged in public service, including central stations, electric railways and certain other plants, the output of which contributes to the public supply. The returns received represent about 85 per cent of the total generating capacity. For plants which did not make returns or which were unable to furnish the data requested, estimates of output were made from available information. The output for the month of February average 110,000 kw.-hr. per day, of which 39 per cent was produced by water power.

THOUSANDS OF KILOWATT-HOURS PRODUCED IN FEBRUARY

State	By Water-Power	By Fuels	State	By Water-Power	By Fuels
Alabama	39,372	12,939	Montana	69,220	1,552
Arizona	3,967	16,395	Nebraska	810	16,022
Arkansas	77	6,275	Nevada	2,913	137
California	190,462	38,295	New Hampshire	4,660	2,188
Colorado	13,161	17,271	New Jersey	165	79,153
Connecticut	12,419	38,643	New Mexico	59	1,273
Delaware	0	5,549	New York	204,590	288,986
District of Columbia	0	18,094	North Carolina	43,234	2,820
Florida	678	11,257	North Dakota	0	2,308
Georgia	35,497	7,236	Oklahoma	2,309	181,786
Idaho	42,050	259	Oregon	223	12,092
Illinois	13,701	241	Oyo	27,034	3,259
Indiana	3,761	21,930	Pennsylvania	55,066	245,098
Iowa	44,214	36,151	Rhode Island	383	28,767
Kansas	1,267	23,110	South Carolina	64,745	3,235
Kentucky	4	29,203	South Dakota	4,624	3,751
Louisiana	4	18,900	Tennessee	43,780	8,365
Maine	16,611	14,034	Texas	165	43,151
Maryland	278	132	Utah	48,906	0
Massachusetts	19,147	18,448	Vermont	13,777	2,067
Michigan	49,980	97,187	Washington	17,093	17,695
Minnesota	24,525	28,708	West Virginia	1,453	51,584
Mississippi	0	3,769	Wisconsin	28,284	32,709
Missouri	4,297	37,212	Wyoming	1,251	3,542
Total				1,220,972	1,879,182
Combined total					3,100,154

Electric Locomotives of Moderate Weight and Power

With Particular Reference to Freight Handling Requirements on Electrified Steam Road Branch Lines and Interurban Electric Railway Lines

By A. B. COLE

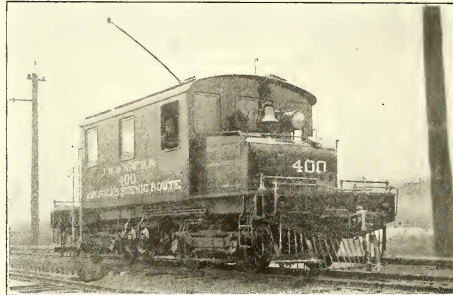
Westinghouse Electric & Manufacturing Company

ELECTRIC locomotives can generally be considered in two groups, regardless of system of current supply, namely, the powerful machines which are used in heavy electrifications on the main lines of important steam roads, and the lighter locomotives which find their field of application in less conspicuous duty in the electrified zones of steam roads and in handling freight cars on interurban lines. The former locomotives are of special designs, each railroad system having its own requirements and its own ideas as to how these are to be met. The design of the lighter machines tends more to standardization.

The purpose of this article is to point out some of the design features of the second type of locomotives and to show what one of the large manufacturers of these machines has developed as a satisfactory arrangement of control and other equipment on the basis of its experience. For convenience these machines will be referred to as interurban locomotives.

SOME GENERAL CHARACTERISTICS OF THE LOCOMOTIVES UNDER DISCUSSION

Standard interurban freight locomotives are usually of the "steepie" type. To many this is preferable to the box type in appearance, and it is free from compressor noise. The cab proper is built of steel with rolled steel channels for the underframe. A hardwood floor is provided in the cab, and a checker-plate walking platform is used outside the cab. All-metal bumpers are used and the splintering so often found in wood bumpers with steel plates is thus avoided. M. C. B. couplers mounted in bumper pocket castings are standard, but where trailing loads must be hauled around short-radius curves, these couplers may be mounted on radial draw-



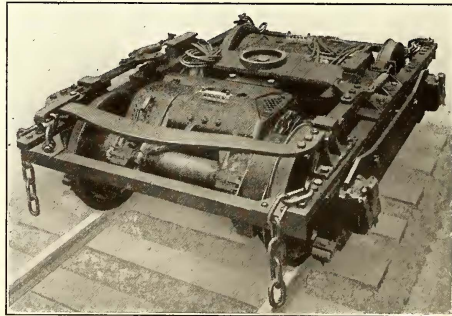
A 50-TON INTERURBAN TYPE LOCOMOTIVE

bars. Friction draft gear, or spring draft gear can be used to meet severe conditions. When the weight of a given type of locomotive of a sufficient electrical capacity is less than the weight required from the standpoint of adhesion, additional weight is provided, principally in strengthening the various members rather than loading with ballast. The trucks are of the rigid bolster equalized pedestal type. This type of truck has a minimum number of wearing parts and no projecting springs and provides a substantial means of transmitting the high tractive efforts required in freight service. The various members of the trucks are held together by tapered bolts in reamed holes. Swivel trucks with brakes actuated through a radius bar are standard, due to the ease with which they negotiate short-radius curves.

RELIABILITY IS THE PRIME CONSIDERATION

Two of the most important factors to be considered in handling freight are reliable operation of equipment and continuity of service. The first is of prime importance in that on many roads there are but one or two electric locomotives and these must be available for service at all times, irrespective of the fact that they must be kept in operation as much of the time as possible.

In designing a locomotive equipment five essential features must be considered: (1) The weight, type, capacity and mechanical design should be suitable for the service requirements. (2) The motive power apparatus should be selected to meet the service conditions. (3) The apparatus on the locomotive should be mounted in such a way that each part will be permitted to operate to the best advantage, with the chance of trouble reduced to a minimum. (4) All apparatus should be accessible for inspection, maintenance and overhaul-



TRUCK OF INTERURBAN FREIGHT LOCOMOTIVE WITH MOTORS MOUNTED

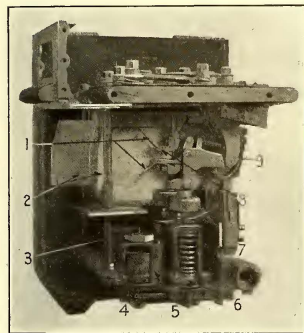
ing. (5) There should be no danger of the operator being thrown in contact with the live parts.

Centralization of control equipment is very important and one arrangement of this is shown herewith. This has a number of advantages, some of which are summed up briefly as follows:

In the first place, all control apparatus is assembled compactly in one part of the locomotive, and the switch groups are located in such a manner that they are readily accessible from all sides and at such a height that a man can get at them freely.

Another feature is the location of grid resistors above the switch groups which are placed under the roof, reducing the length of connections between these two pieces of apparatus to a minimum. All heat from resistors passes directly through the roof ventilators and practically none reaches the switch groups. The reversers and series parallel switches also are readily accessible, and at the same time are centrally located relative to the propelling motors, thus requiring a

minimum amount of cable. Again, the air-brake distributing valve is located inside the cab, protected against freezing and easily accessible. Objectionable noise and drafts inside the cab are eliminated by placing the compressors and blower motor in the hoods, which location makes it easy to lift them out by merely taking



DETAILS OF UNIT SWITCH
1, Arcing horns; 2, arc chute; 3, magnet valve stem; 4, air valve; 5, operating magnet; 6, air cylinder; 7, operating spring; 8, contact tips; 9, contact shunt.

off the hoods without disturbing any other apparatus. Finally, all control parts are visible and at the same time protected from accidental contact by grounded expanded metal screens which are made up in sufficiently small sections to permit ready removal for inspection of apparatus.

RUGGEDNESS OF EQUIPMENT IS AN ELEMENT IN RELIABILITY

The demands of freight service require motive power equipment of rugged construction, and in locomotives of moderate size the features that have proved successful in city and interurban cars have been incorporated. The motor characteristics, however, had to be changed to furnish low-speed freight service at good efficiency, hence a low-speed locomotive motor was brought out. This produces high tractive effort at low power demand (the locomotive speed being low), making possible the hauling of freight on roads of limited substation and feeder capacity.

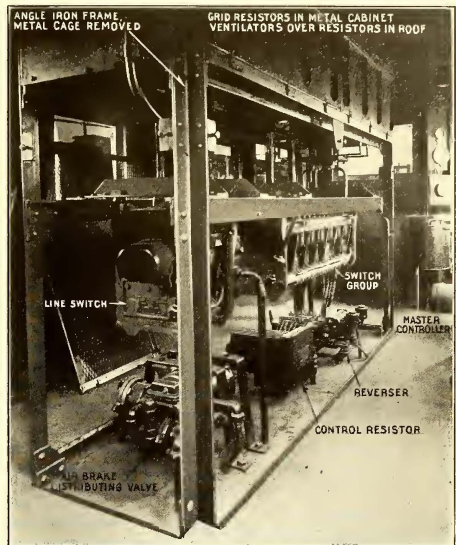
Design features introduced to insure reliability and low maintenance cost include particularly the following: (1) Form-wound armature coils, with special insulation in the ends of the slots. (2) Strap-wound field coils securely fastened and held against vibration. (3)

Substantial brush-holder design and construction. (4) Mica insulated, undercut commutators. (5) Bearings of ample size with oil-gaging pockets, lubricated by oil drawn up and filtered through waste. (6) Two-point gear case suspension.

UNIT SWITCH PLAN SOLVES THE CONTROL PROBLEM

The unit switch control is used on locomotives, the Westinghouse Company having adopted the air-operated, "HL" type for this purpose. This has proved itself capable of handling the heavy currents encountered and also to withstand the bumps to which the locomotives are subjected, particularly in switching work, low-speed drag-freight service or main-line service.

The designers of this control have had in mind the following requirements: (1) Ample protection against



CONTROL EQUIPMENT AFTER REMOVAL OF SCREEN

too heavy overloads, grounds, short-circuits, surges in the contact line and lightning. (2) Simplicity of apparatus and circuits. (3) Powerful forces at the contacts. (4) Contact pressure independent of line voltage. (5) Small number of wearing parts. (6) Ease with which contacts and arc chutes may be renewed. (7) Small number of simple, rugged interlocks. (8) Ease of operation of two or more locomotives from the same master controller.

In this control the various main circuit connections are made by unit switches, actuated by compressed air taken from the air-brake system; the admission of air to the switch cylinders being controlled by magnet valves. These magnet valves are operated by current from a control circuit through a train line from the master controller. Current from this control circuit is tapped from points on the control resistor which is connected between trolley and ground, or may be supplied by a storage battery. One of the illustrations shows a cross-section of an HL-control switch group.

Some of the distinguishing features of the construction of the switch group are brought out by the numbered arrows on the illustration of the unit switch reproduced on page 1153, as follows:

(1) Bronze arcing tips carry the arc out from the butt contacts under the impetus of a magnetic blow-out flux. The arc traveling outward on the tips is cooled so that little burning takes place. (2) Reversible asbestos lumber arc chute sides, removable by pressing aside a small spring retainer, confine the arc to limited space. (3) Pins which when depressed admit air to the cylinder and operate the switch mechanism, permit inspectors to test the movement of each switch without any current on the locomotive. (4) The valve mechanism, under the action of an electromagnet energized from the master controller, permits the entrance or exit of the

compressed air which operates the switch. (5) The valve actuating magnets are inclosed within weather-proof cast-iron shells. The coils are impregnated with "bakelite." (6) The piston, which forces the movable contact upward is made of triple-ply treated leathers reinforced with metal expanders. (7) The heavy coiled spring exerts 100 lb. pressure against the piston. Upon release of air from the cylinder the switch jaws are quickly separated. (8) Heavy copper butt contacts comprise the switch jaws. They are self-cleaning by virtue of a "wiping" action which takes place during opening or closing of the switch. Their current carrying capacity is made positive by the contact pressure secured by the use of compressed air. (9) Heavy flexible shunts of braided copper relieve all bearings and pins of duty.

Methods Used in Third-Rail Bonding

High Conductivity Is the First Essential, and Ease of Installation and Maintenance Are Important Considerations

By G. H. MCKELWAY

Engineer of Distribution, Brooklyn Rapid Transit System

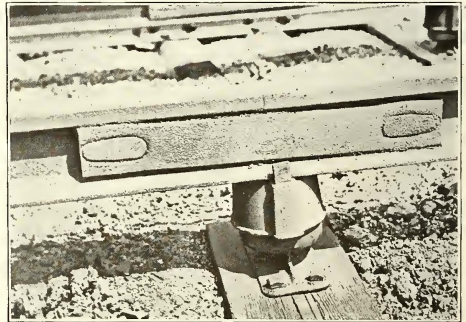
THE methods used in the bonding of conductor rails of third-rail systems are similar in many respects to those used in bonding running rails, but they are generally simpler. The reason for this is that the third rail is considered solely in regard to its use as a conductor of electricity while the running rails have a double function to perform. The carrying of current by them is the less important function, always subordinated to their use as part of the track over which the cars must operate. The running rails themselves and the joint plates connecting them must first be considered from a mechanical standpoint and designed to withstand the stresses to be imposed upon them by the rolling stock. The bonding must be installed so as not to weaken the rails or joints, or in any way to interfere with maintenance or repair.

The conductor rails, on the other hand, are not exposed to the loads which the track rails must continually support and the blows which they must receive. The joints can thus be designed to give ample clearance for the bonds, with only so much of strength as is needed to withstand the comparatively light wear and the light blows from the third-rail shoes.

At first the usual practice was to install, as third rail, old running rail that had outlived its usefulness in the track but which answered quite well as a heavy conductor. If a rail heavier than the light track rails was wanted, or one on which there would not be so much maintenance as on the old rails, new ones were bought, but nearly always they were of the same section and composition as those used in the tracks.

PREVIOUS TYPE OF BONDING USED WITH OLD RUNNING RAILS

With such rails it was only natural that the old type of joint plates should be used and that the rail, when set up on insulators at the side of the track,



WELD ON THIRD RAIL JOINT

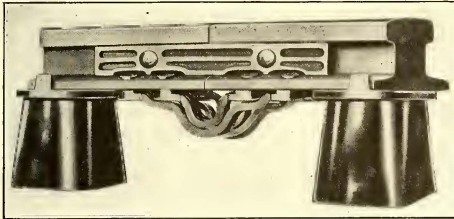
should be bonded in the same manner as was done when it was part of the track. As the bonding most generally used with T-rail is the expanded-terminal type, either under or around the joint plate, that type was usually used when the old track rail was used for the third rail. In nearly all cases the old bond holes were used for the new bonds which were installed in the usual manner.

While protected bonds compressed into the web of the rail made a very satisfactory job and one that would last for a very long time if the bonds had been well installed, yet, as the bonds were placed under the plates, their condition could not be told by inspection alone and repairs to defective bonds were rendered more difficult and expensive than would have been the case if the bonds had been exposed. Furthermore, there was almost no reason for putting the bond under the plate, except that by so doing a shorter bond could be used than if it had been installed around the joint, as the

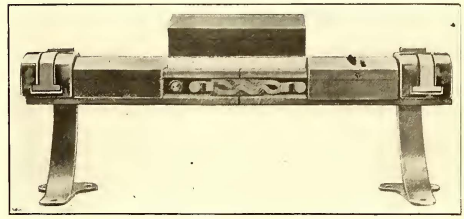
liability of persons stealing the bonds from live third rail is very slight.

But the installation of bonds outside of the plates and compressed into the web of the rail required the use of bonds that are quite long and, therefore, both expensive and inefficient, hence attempts were made to use either the head or base of the rail as the place for installing the bonds. Bonds so installed have proved very satisfactory and have been widely used, especially on roads where the third rail is made of a soft steel of special composition and section. The thick webs of such rails necessitate the use of bonds with very long terminal studs if the studs are to go entirely through the web of the rail. Such bonds have been used, even when the web of the rail has been as thick as 2½ in., but the more usual practice has been to

necessitate any cutting, is one composed of flexible copper ribbons formed into a U-shaped loop and soldered under the base of the rail. By the use of this the rail can be heavily bonded and it will be unnecessary to install more than one or two of these bonds. If well put on, the bonds will "stay put" much better than soldered bonds placed at any other point on the rail and will give satisfactory service. The bonds, however, cannot be put on to advantage after the rail has been placed on the insulators so they must be installed while the rail is turned over on its side or head and after the joints have been bolted up. Then a long section of the rail is set in place at one time. It is obviously impossible to renew bonds of this type satisfactorily after the rail has been placed in commission. On the head of the rail the bonds are installed by



FOOT BONDS USED IN PENNSYLVANIA RAILROAD TUNNELS



PROTECTED TYPE BOND APPLIED TO DOUBLE HEAD PROTECTED THIRD RAIL

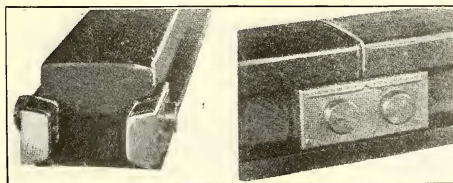


SOLDERED TYPE OF RIBBON BOND FOR HEAD OF RAIL



TWIN TERMINAL BONDS ON HEAD OF RAIL

use other types of bonds even where rails with thinner, but still comparatively thick, webs are placed on the insulators. The application of bonds to the base of the third rail was tried out comparatively early and that location has been a favorite one for the installation ever since. The splice bars may be merely



BOLTED AND SOLDERED SPLICE BARS

flat plates bolted up tight against the webs of the rails, as there is no necessity for supporting the head as would be the case with a running rail. This arrangement leaves plenty of room on the base of the rail outside of the plates into which the foot bonds can be compressed and where they neither interfere or are interfered with, by the splice bars. If for any reason it is desired to use the ordinary type of angle bar extending down over the base of the rail, sufficient portions of them can be cut away at the points where the bond terminals will come to permit of the easy installation of the latter.

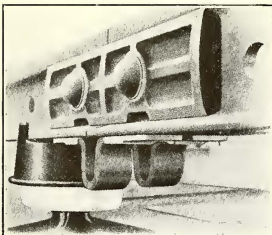
Another type of foot bond, with which angle bars can be used and the installation of which will not

either riveting, soldering or welding. The twin-terminal bond has been used to a large extent for this work. This bond, as shown in an accompanying illustration, consists of two short loops of stranded wire having at their ends terminals at right angles to the loops made by the wire and lying against the head of

the rail. From each of these terminals two studs project. The bond is applied by first drilling two holes into each end of the abutting rails at the proper distance apart, the holes being ½ in. deep and ½ in. in diameter. An annular groove is cut near the top of each of the holes by a swinging milling cutter rotated in the hole. Then the studs are inserted and driven in with a hammer, the soft copper of the studs flowing into the rings and holding the terminals firmly in place.

The soldered bonds are generally made up of ribbons of copper instead of wire, and are soldered to the head of the rail with the loop either hanging down or projecting horizontally. Bonds soldered to the head of the rail have, however, been given up by nearly all

railways as they are too easily knocked off, either by thieves or by something hanging from the car above and dragging along the head of the rail. Again, soldered bonds, although they may seem to be firmly connected to the rail at the time that they are installed, very often loosen up under vibration and then one or both ends of the bond comes away from



SOLDERED TYPE OF FOOT BOND

a single-phase rotary converter or alternating-current generator, together with a transformer, is brought to the job and the bond is clamped tightly against the rail while both the rail and the bond are heated by the current flowing from the apparatus on the car through the clamp and bond into the rail. They are then brazed together, the operator holding a strip of brass and melting it down at the bond terminal. If electric current can be obtained the rotary converter is nearly always used, but if it is not available the current is obtained from the small generator driven by a gasoline engine.

NORMAL POWER SUPPLY CAN BE USED BY INSERTING RESISTANCE IN THE CIRCUIT

Another plan, which can only be used when current is available, is to reduce the voltage by the use of resistance in the circuit. The bond and rail are then heated by an electric arc and the molten welding material, either copper or iron, is flowed around and under the terminal, welding it to the rail.

In the third plan, the heat applied is received from an oxy-hydrogen, oxy-acetylene, or similar flame and

This, however, has proven even more of a failure when tried with third rail than with the running rails. The reason for trying it with third rails has generally been that the work has been of only a temporary nature and it was believed that the bolts in the third rail joints would remain tight much longer than those in the track. The results, however, have always proved that rust will work in between the rails and the plates, making a high resistance joint, and that the bolts will soon become badly burned.

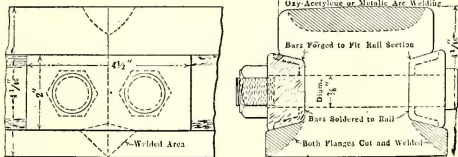
The ordinary welded joint, similar to the welded joints in the tracks, has been used and has given great satisfaction, the only objections being the high first cost and the difficulty of opening the joints later if that should be necessary on account of an accident, when it may be desired to have the rail alive up to the wreck so as to permit bringing up the wrecker, but to have it dead at the point of trouble so that the men can work without danger. Another objection, when the welding is done according to the scheme largely used on track rails, is the cumbersome train of welding cars needed and the inability later to use that type of joint in scattered work as the cars are owned by an outside company and are therefore in the section where they might be wanted only occasionally. Then it would be necessary to route the traffic around the cars while they work, as they occupy the track on which they work. Again, unless the third rail should be very low and close to the running rail, it would be impossible to weld the joints in place, the usual plan being to weld long sections at one time while the rail is on the ground and later to place it on the insulators.

Thermit joints can be made with the rail in place on the insulators and scattered joints can be welded by that method without the interference to traffic necessitated when cars are used. The price of the completed joint is, however, quite high and that is the principal reason why it has not been used more extensively.

Still another welded joint which has been brought to a high standard of perfection is one where the plates are used and are not only bolted up but their two edges are seam-welded to the rail by means of an electric arc and then the abutting ends of the rails are joined together by means of molten tin poured into the opening between them.

One other method of obtaining joints of high conductivity and current carrying capacity, yet of not too high first cost, has been by the casting of a short heavy copper bond connecting the ends of the rail, a mold being placed on each side of the joint and the molten copper being poured in as with the ordinary cast weld. When the copper has cooled the excess is cut away, leaving a very short joint of high conductivity. This joint must be very carefully made or there will be trouble on account of its breaking as a result of vibration or the expansion and contraction of the rails.

Still another joint which has given good satisfaction is made by bolting and soldering a short piece of copper to each side of the joint, only one bolt passing through the end of each rail. These bolts are made of special steel so as to give sufficient strength to withstand the pull of contraction that may be placed upon them and in addition a portion of the top of the head of each rail is cut away at the end and then the ends of the rails welded together by this space being filled in with molten metal deposited by arc welding. This not only strengthens the joint but adds to its conductance.



DETAILS OF THIRD RAIL WELDS AND BOND

the bond is attached to the rail in the same manner as is done when the electric arc is used.

Carrying still farther the idea that the third rail should be treated as a conductor and not like the running rails, a few companies have combined the bond and splice plate into one piece by welding the ends of the rails together or by some other method by which a single short piece of metal on each side of the web of the rail will do duty both as bond and splice bar.

There have been attempts to do away with the use of bonds by merely bolting the plates up tightly to the rails and depending upon them to carry the current.

Solving the Traction Problem*

Electric Railways Are Faced with Permanently High Operating Costs and Aid Through Increased Receipts Is Urgently Needed

By THOMAS CONWAY, JR.

Professor of Finance, University of Pennsylvania

WHILE a considerable proportion of the electric railways in this country have secured some relief, yet many properties have been unable to increase revenues sufficiently to offset the largely increased cost of operation. Various reasons have been cited for the failure to secure relief in such cases. In some states, as for example, in New York, the courts have denied to the commission power to increase rates beyond the maxima specified in the franchises. In a very few states, the public service commissions do not exercise jurisdiction over electric railways. Under both conditions the appeal for relief, therefore, must be directed to the city authorities.

I know that you will all agree with me that the average city official does not possess the technical training necessary to enable him quickly to analyze and weigh the merits of such an appeal, nor do the cities have an organized staff of trained experts, engineers and accountants versed in the intricacies of traffic, engineering and accounting matters, on whose analyses the city authorities can rely. Therefore a longer period of time has been required to secure a proper adjustment of fares in those cases in which the city itself had to decide upon the merits of the case.

There has been, moreover, a feeling of distrust in certain quarters concerning the genuineness of the need of the electric railways for relief, and much confusion of mind has arisen as to the proper course to be pursued in granting such relief where the necessity thereof was established. In such cases, the companies have suffered because of the delay which has occurred, but the disadvantages have been almost as great to the patrons of the electric railways and to the municipalities in which they operate. Many persons have felt that good progress could be made in the wise solution of the question by the appointment of some board or commission whose membership would be such as to command the confidence of the public at large, to which would be delegated the task of making an investigation of the general status of the industry and suggesting the way in which needed relief should be granted.

It is the announced intention of the Federal Electric Railways Commission, just appointed by President Wilson to avoid passing upon local questions; that is to say, attempting to adjudicate the merits of any particular application for an increase in fares. It is the intention of the commission, as I understand it, to make a general study of the position of the industry and a critical analysis of the various methods of relief which may be suggested, the purpose being to place at the disposal of state and local authorities a fund of information upon which they can act intelligently in solving particular problems.

Under present conditions, the solution of the electric railway problem can be accomplished by a possible combination of two methods. The first involves a decrease in expenditures, the possibilities of which are compara-

tively limited. Wherever inefficient operation prevails, the cities should insist that the companies adopt the most approved methods of operation, or at least that the loss occasioned by inefficient methods be borne by the railway and not passed along to the car rider as a part of an increase in fares. The greatest opportunity for decreased expenditures lies in a reduction of state and municipal taxation, the elimination of local paving requirements, and other relief of a similar nature. Unfortunately, many municipalities do not feel that they can, at this time, spare the revenue heretofore derived from the taxation of railways or assume the paving burdens which have been placed upon these corporations. Municipalities, like the electric railways themselves, find that the cost of doing business has largely increased, with the result that the cities are casting about for a way to secure larger revenues rather than to reduce the sources from which revenues have been heretofore derived.

From the standpoint of the equities of the case, no good reason can be advanced why the car rider should be required to pay higher fares in order to maintain street paving which he in no way wears out while taking his car journey. The tremendous increase in the use of the automobile, especially the growing number and size of auto trucks, has brought about very rapid deterioration in street pavements and has required a much more expensive type of pavement than has heretofore been deemed necessary. Under present conditions, there is no reason why the railways should be required to maintain pavement, except in so far as they themselves destroy the pavement while making repairs to their tracks. The paving burden should in equity, be shifted to the shoulders of those who use and wear out the pavements. The registration fees required of both passenger and commercial automobiles are very moderate, and I believe a much fairer solution of the problem could be secured by passing the burden of maintaining road pavements of all kinds along to the owners of automobiles and other vehicles, the tax being graded in proportion to the destructive effect of the various classes of cars.

OPERATING COSTS WILL NOT DECLINE

One of the important functions which the new national commission can perform will be to inform the public at large of the continuing character of the electric railway cost problem. In so far as the next few years are concerned, there is no prospect of a material reduction. The cost of labor will tend to increase rather than diminish. It is true that a decline has occurred in some places in the rates paid common labor, but offsetting this are the demands for higher wages and shorter hours of the organized skilled and semi-skilled labor, of which the most important class is the trainmen. There are now pending before the National War Labor Board a large number of cases in which the employees are seeking higher wages than heretofore allowed by the board. Employees of the Detroit, Pittsburgh, Public Service, Bay State and numerous other companies are now asking for higher wages and shorter hours.

The outcome of these demands is, of course, uncertain, but it should be remembered that the electric railway industry is face to face with a world-wide demand for an eight-hour day. The granting of this demand would mean a very material increase in operating costs, because of the peculiar conditions surrounding the electric railway business. Unlike other businesses, it is impossible to offset the reduction in the working day

*Abstract of address before the New York State Conference of Mayors at Schenectady, N. Y., June 11, 1919.

by a speeding-up process. The motorman and conductor cannot increase their productive power in this fashion, for the speed of the car is determined by practical considerations, such as matters of safety and the convenience of the public. To what extent the labor cost will increase is problematical, but in view of all of the factors which are involved, I am certain that there is no prospect of any material reduction in labor costs.

With no chance for a reduction in two-thirds to three-quarters of the operating expenses representing payments to labor, the possibilities for economies are therefore largely reduced. What is the situation concerning material costs? It is probable that with the passage of time, some reduction will occur in the prices of steel rails, copper wire, motor parts and the thousands of other articles purchased by electric railways, but so long as the labor costs in the industries producing these articles remain high, it is impossible to expect a reduction in the prices of these commodities to anything approaching pre-war levels. The electric railways are face to face with the necessity of permanently paying high prices for materials and supplies.

Moreover, in so far as the total operating expenses are concerned, any possible reduction in the cost of the various materials purchased will be more than offset by the larger quantities which must be purchased. In response to a national policy, the electric railways, like other industries, confined their expenditures for the repair and renewal of track and other portions of their properties to a minimum during the war period. But this policy cannot be indefinitely continued. Indeed, the industry at this moment is face to face with the necessity for very large expenditures to make up, by degrees, for the failure to do a normal amount of work during the war. The cost of a normal amount of renewals and replacements is materially larger than the expenditures for such purposes made during 1918. When the increased expenditures for renewals are carried into the results for the year, it will be found, in practically every case, that the total expenses of the electric railways are materially greater than they have ever been in any preceding twelve months period.

THE SO-CALLED "EMERGENCY" IS A PERMANENT CONDITION

The "emergency," as it is termed by the public, has therefore not passed and will probably never pass, in the sense in which the term is used by the average man. The cost of operation of the electric railway has been permanently placed upon a higher level, and it is idle to evade the consequences which are entailed. To meet largely increased expenses requires materially increased revenues, and this is true no matter who owns the electric railway or who operates it. The service-at-cost plan does not enable the community to escape the necessity for meeting increased expenses.

If the municipalities themselves owned and operated the electric railways, sound business policy would demand that revenues be increased sufficiently to meet increased expenses. It is now a well settled policy of municipal finance that water works should be made self-supporting and, indeed, there is no rational stopping place under municipal operation between service without charge, as in the case of sewers, and service at what it costs the city. The sooner we realize that no matter what form the solution may take, it must be placed upon the firm foundation of collecting sufficient revenue to

defray the cost of service, the more quickly can we take up the question as to exactly what form the solution should take.

There is no doubt that certain companies have been heavily over-capitalized in past years and that men have gotten rich by putting together consolidations and selling securities to the public aggregating much in excess of the fair value of the properties. I stand here to hold no brief for such financial methods. They were iniquitous and have resulted in irreparable damage to the industry as a whole. I do not believe, however, that, taking the electric railways as a group, there has been anything like the overcapitalization which the public at large has been taught to believe exists.

The first step in the solution of the present problem is a frank understanding by both the companies and the public of the necessity for the determination of fair value, in order that the public may know whether the return which they are asked to pay to bond and stockholders is more than a reasonable return. If the public and the company are both agreed that no more should be asked or allowed than a fair return upon the fair value of the property, the matter of capitalization becomes of minor importance, and it is then possible to demonstrate to the people of any city that it is to their selfish interest to see that this return is paid, rather than to grind the railway into bankruptcy by insistence upon a franchise stipulation concerning fares.

ONLY ALTERNATIVE IS INCREASED FARES

If it is granted that the companies are entitled to increased revenue sufficient to offset increased operating expenses and taxes, the problem of how this increase is to be secured arises for solution. The necessity is so great that the only alternative in most cases is an increase in fares. The evidence at hand shows clearly that increased fares do not bring a mathematically equivalent increase in revenue. Increased fares discourage short-distance travel and to some extent decrease the volume of long-haul business. The average man believes that the electric railway enjoys a complete monopoly, and indeed the theory of our law sustains this belief; but as a practical matter, the electric railway in most cities does not by any means enjoy a complete monopoly. In the smaller cities, an increase in fares beyond a certain point will defeat the desired end by driving people to the sidewalks. In the smaller cities, one may walk from the business center to any residential district in twenty minutes or one-half hour. Higher fares encourage the walking habit, on the part both of those taking short journeys in the business district and of those traveling between their places of employment and their homes.

The electric railway, moreover, encounters a most serious competitor in the automobile. The people of New York are to be congratulated upon the good sense which was displayed by their Legislature and commissions in outlawing the unfair competition by jitneys. The privately owned automobile, however, has exercised a most serious effect upon the electric railway business. In 1914, 1,574,431 pleasure cars were licensed for operation in the United States. In 1918 the number of pleasure cars licensed was 5,352,350. It is hard to believe that such an enormous increase in the use of the automobile could have occurred in such a short period. The automobile has not only decreased riding upon the trolley cars during business hours, but it has deprived

the railway of practically all of its pleasure riding. The entire economic basis of the industry has been undermined, and it requires no prophet to see that if the business is to survive it must be a radically different business ten years from today than it is at the present time. It must, in the first place, secure prompt and adequate relief by a sufficient increase in revenues to enable it to function as a public utility; for a rejuvenation of credit is essential to carrying through the radical readjustment in operating methods which, in my opinion, will be necessary. In many of our smaller cities, the companies must turn to one-man cars, permitting more frequent service with reduced operating costs.

In our larger cities, I believe the time has come when the companies and the public must face the necessity of abandoning the theory of a flat 5-cent fare covering the entire city area, and of charging the passenger according to the distance which he rides. It is inequitable and, as a business matter, unjustifiable to expect the short rider to pay 7, 8, 9 or 10-cent fares in order to defray part of the cost of carrying the long distance rider. The next few years will witness important experiments in the attempt to base fares upon the service rendered, charging the short distance rider a fare not in excess of 5 cents and providing increments above that amount as the length of the journey increases.

The solution of business questions of a public nature is the acid test of a democracy. I believe every fair-minded municipal official will agree with me that nothing is to be gained by dodging the solution of the traction problem. Every day of delay makes the solution more difficult. I think the American public is convinced, especially in view of recent experience with federal operation of railroads and telephone and telegraph lines, that greater efficiency is to be secured under private operation. Exceedingly few of our municipalities are in a position to finance the purchase of their electric railway systems, and, as a prominent municipal official of New York City has recently put it, "it would be bad policy to buy a losing business." If private operation is the most satisfactory, and the municipalities are not in a position to purchase their electric railways and lease them to private operators (the advantages of which are very debatable), then the only course which remains is to make it possible for the present owners to give good service and to meet the demands of the community, which entails a just and reasonable increase in revenue sufficient to offset the increased cost of service.

There is no more important question before the municipal officials of the State of New York than the solution of the electric railway problem. It is to be hoped that the question will be dealt with in a broad-gaged spirit by both sides, for the electric railway is a necessity of city life, and as such deserves unbiased and enlightened treatment on the part of those who have it in their power to grant such relief as may be necessary under the circumstances of each case.

Vacation Days Among the Pines

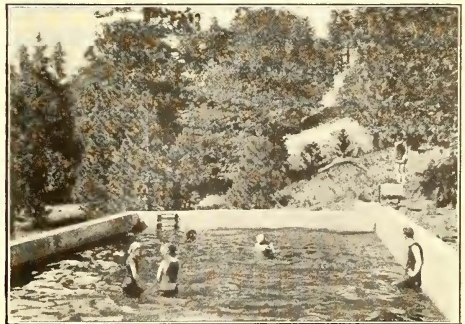
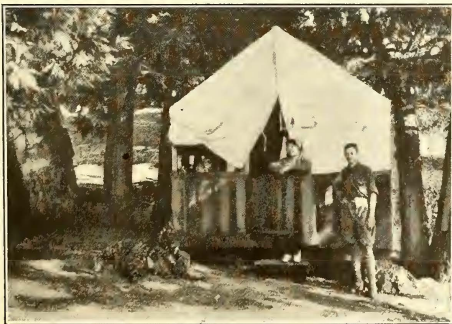
NOT many electric railways in the United States are able to provide such a vacation camp for employees as the Pacific Electric Railway has done in California, but this company's example may encourage others to do the best they can with the natural means at their disposal.

The Pacific Electric Railway "Vacation Home," which last year entertained more than 800 employees and their families for varying periods, is on a wooded 15-acre tract in the San Bernardino Mountains, 22 miles from San Bernardino and 1½ miles from Little Bear Lake. The principal buildings are the Social Hall and the delicatessen store, with lunch counter. There is also a fine swimming pool, 30 ft. x 60 ft.

The residents are housed in tent cottages, 9 ft. x 12 ft., furnished with bed and springs, mattress, washstand, bowl, pitcher, mirror and chairs. Each tent has a kitchen equipped with an oil stove and other necessary housekeeping equipment. Where employees have their own camp outfits, space for camping is furnished free.

Upon the basis of present food prices it is calculated that supplies for a family of two cost \$8 to \$12 a week and for a family of four \$15 to \$18 a week. The tent cost for single persons, who must combine in groups, is \$2.50 apiece a week, and for a family of two or more (all dependent except the head) the cost is \$3.50 a week. Non-dependent relatives or friends may be included if spare equipment happens to be available at the time of arrival. The company furnishes free round-trip transportation to employees and their dependents from any point, and the San Bernardino Mountain Auto Line gives reduced rates to these.

Two weeks is the maximum stay permitted unless the camper has his own outfit. Camp periods begin and end with Sunday. Reservations cannot be made for split weeks. The season begins on June 15 and extends to Sept. 15.



HOW THE PACIFIC ELECTRIC RAILWAY MAKES VACATION PLEASANT FOR ITS EMPLOYEES

Philip Dawson on Future Electrification

Ministry of Ways and Communications Will Temporarily Retard But Eventually Accelerate Electrification on a Large Scale—Plans Made by Individual Railways Would Be Altered in Some Particulars—A Wider Choice of Systems Now Possible—Success of the Brighton Electrification Leads to More Ambitious Plans for Early Development

PHILIP DAWSON needs no introduction to the American electric railway engineer nor to other readers of the *ELECTRIC RAILWAY JOURNAL*. In his early days, Dawson's "Electric Traction" quickly became the handbook of the street and interurban railway.

In the last decade, Mr. Dawson has achieved fame through his pioneer work in heavy electrification, notably that of the London, Brighton & South Coast Railway's suburban lines. Full of irrepresible vim and energy, he is the type of man whose interest in life extends far beyond the field of his profession. Consequently, it is not astonishing to learn that he has recently been elected on the municipal reform ticket to represent West Lewisham on the London County Council; nor that he was promptly made a member of the highways and electric supply committees. The function of the latter is explained by its title, but the scope of the highways committee work includes not merely highways, bridges and ferries, but also the large tramway system operated by the London County Council. As election to the council brings no salary, it is obvious that the L. C. C. stands to get some high-class engineering for nothing.

Mr. Dawson is also a member of the commission appointed by the Belgian government during the war to investigate the future of Belgian State Railways, rendering valuable service for which the King of the Belgians has created him Chevalier de l'Ordre de Leopold.

Since the Belgian government has returned to its capital, Brussels, a very important commission has been created by the Belgian Minister of Railways under royal decree, to report to the government on the advisability or otherwise of electrifying a portion or the whole of the railways and to investigate and report on the problem of co-ordinating the electric power generation and distribution of the country.

The commission comprises all the heads of departments of the Belgian State Railways and the post and telegraph service, the professors of electrical engineering of the Belgian universities, and a number of representative business men, manufacturers and bankers nominated by the Crown, as well as the electrical and mechanical engineers of the French State Railways, the Chemins de fer du Midi and the Chemins de fer d'Orleans. Mr. Dawson has been appointed one of the two vice-presidents of the commission, which is presided over by Baron Ancion, a well-known Belgian senator, who is con-



PHILIP DAWSON

nected with large coal, iron and steel and banking interests.

Mr. Dawson is also a member of the committee set up in England by Sir Albert Stanley, president of the Board of Trade, to investigate the water-power resources of the United Kingdom, having been appointed to this position by the president.

The accompanying portrait of Mr. Dawson shows him in another and more readily recognized form of patriotism, namely, as a military man. Although his fifty-two years barred acceptance of his services in the field, he promptly offered his services as a volunteer and became major in command of the Third Volunteer Battalion, Royal West Kents.

In discussing electrification possibilities with Mr. Dawson it was natural to ask him first what the effect, favorable or otherwise, would be of the formation of a Ministry of Ways and Communications as proposed with such far-reaching powers of co-ordination. He replied that in principle this would be an excellent thing for the advancement of electrification. To be sure it might retard the early electrification of certain individual systems, but in the long run it would accelerate electrification. What he feared was that electrical enthusiasts would lead the public to expect too much of electricity. People were already talking about a farthing a unit ($\frac{1}{2}$ cent per kilowatt-hour) for electric energy for lighting, power and heating, and of main-line electrification over night. The old dangerous magic associated with that mysterious "electricity" threatened to come into action again.

As a man of business, as well as an electrical engineer, Mr. Dawson said that he had only one test to propound concerning electrification, and that

was "Will it pay?" Countries like Italy, Sweden, Norway and Switzerland were undoubtedly right in considering the electrification of practically all their lines, because they have no coal of their own but have plenty of water power. In such cases strategic reasons and national economies were ruling factors. Great Britain, however, could look at the problem of electrification in a different light. It has plenty of coal and little water power. Electrification, therefore, is chiefly a proposition of getting back the interest on the investment. Subjected to this test it would be found that immediate electrification of the majority of long main lines would be unprofitable. On the other hand, there were ample reasons for the electrification of such districts as Birmingham, Manchester, Liverpool, Glasgow and Newcastle, and certain heavy freight lines.

The territory served by the Brighton Railway is especially suited for one of the auxiliary advantages or by-products of electrification, namely, the sale of power to industries along the line. In Great Britain there is much talk of a universal development of power supply for the so-called cottage and agricultural (particularly dairying) industries, but there is also the possibility of serving other members of the population within short tapping distance of the railway's right-of-way. As a transmission line would have to be put up in any event, the railway is in a position to supply current cheaper than if independent supply lines were built.

GREAT INCREASE IN CAPACITY OF ELECTRIFIED BRIGHTON TERMINAL

In discussing the results of the Brighton electrification completed under his direction, Mr. Dawson said that electric motor-car operation had already permitted the Victoria Terminal in London to handle 150 per cent more traffic than before, and another 150 per cent could be borne with ease. Since the electrification in 1909 a still more significant phenomenon showing the value of electrifying suburban lines has occurred. This was the increase in suburban traffic. The number of single-ticket riders has more than doubled and, what is still better, the number of season-ticket riders (commuters) has nearly quadrupled. He felt confident that the electrification to Brighton, Worthing and Eastbourne which is being clamored for by the population would be equally successful. It must be remembered, he said, that when the Brighton Railway first took up the matter of electrification, the choice lay between low-tension 600-volt direct-current and high-tension

Federal Commission Ready to Begin

Personnel of the Commission Appointed to Study the Electric Railway Problems Promises Valuable Results—Chairman Elmquist Outlines the Task Before the Commission—Other Comments Given

RAILWAY men interviewed during the past week have expressed great satisfaction at the appointment by the President of a federal commission to investigate the electric railway situation. These expressions were both individual and collective. Among the latter was the American Electric Railway Association, whose Washington office issued a statement which was widely quoted in the daily press. This said, in part:

"This commission is destined to be a constructive agency of the greatest importance, not only to the public, but to the electric railway industry, to collateral industries, to the nation's financial institutions and to labor. In fact, it was the reflex effect upon industry, finance and labor of the bankrupt transportation companies that played a leading part in the minds of Secretary Redfield and Secretary Wilson, the members of the President's Cabinet, who recommended the establishment of this federal commission."

WHO THE MEMBERS ARE

The names of the members of the commission were published last week, but further information about them may be of interest.

The chairman of the commission, Charles E. Elmquist, has served in various legal and advisory capacities to public utility organizations. During the war emergency he was secretary of a special war committee, created by the National Association of Railway and Utilities Commissioners, to consider the vital problems affecting gas, electric, electric railway and other utilities and the communities served. Mr. Elmquist was born in Osceola, Wis., forty-six years ago. After attending the common schools of Saint Croix Falls, he became an apprentice in a printing shop and was in the newspaper business a number of years. He was graduated from the law school of the University of Minnesota in 1898 and began the practice of the law in Rush City, Minn. In 1900 he was elected county at-

torney and held this position eight years. In 1909 Mr. Elmquist became a member of the Minnesota Railroad and Warehouse Commission, at a time when the Minnesota rate case was pending in the federal court. The legal and economic questions involved in this case led him to become thoroughly conversant with the facts and the law regarding valuation, rates and other problems common to railroads and other utilities. For a number of years he was chairman of the valuation committee of the National Association of Railway and Utilities Commissioners, which was created to give the state authorities adequate representation before the Interstate Commerce Commission in connection with the valuation of railroads. Since November, 1918, Mr. Elmquist has been president of the National Association of Railway and Utilities Commissioners, as well as its general counsel.

The vice-chairman of the commission, Hon. Edwin F. Sweet, is Assistant Secretary of the Department of Commerce and was formerly Mayor of Grand Rapids, Mich. He also represented the Fifth Michigan District in Congress from 1911 to 1913. While mayor he devised a plan for non-partisan city government which has since been adopted by most commission-governed cities. Mr. Sweet is a man of long experience in public affairs and equipped with special knowledge of commercial conditions through daily contact with them, and brings to the commission not only a broad personal training, but the invaluable records of the Department of Commerce, which are at his disposal.

Louis B. Wehle, who represents the Treasury Department on the commission, is counsel of the War Finance Corporation and consequently has an unusual opportunity to be come acquainted with the financial condition of the electric railways of the country. He is a lawyer and has practiced before the Interstate Commerce Commission since 1910, generally representing the shippers and the public. In addition to his connection with the War Finance Corporation he is a

single-phase, and the instructions he received were that a system had to be adopted for the local services which could be indefinitely extended to include the whole system, including long-distance passenger and goods traffic. This was the reason why he had decided to recommend the use of the high-tension single-phase system, which he did in 1906.

There is every reason to feel gratified with the reliability of the single-phase equipment in use. The overhead system which had been put up according to his design and under his supervision has never given the least trouble or anxiety and has proved eminently satisfactory from every point of view.

In the meantime high-tension direct-current equipment has been developed

to a high standard of reliability. Mr. Dawson said that he is not wedded to any one system and, therefore, in considering extensions to the Brighton Railway or in taking up problems for other lines, he would certainly take advantage of every improvement that would help to make electrification pay regardless of system. The Brighton Railway now has 70 miles of single-track electrified line in operation and is prepared to electrify another 120 miles to Cheam and Coulsden, a project which was interrupted by the war. Another 150 miles of development would bring the electrification to the South Coast terminus at Brighton, a stretch of 52 miles, which would be covered in forty-five minutes. There is nothing slow about British electrifi-

cation! A following electrification would take in Hastings, 75 miles distant, on a section over which trains weighing 300 to 350 long tons would be run at 60 m.p.h.

It is interesting to note that Edward Manville, who is Mr. Dawson's partner, is a member of Parliament for Coventry and is one of the vice-presidents of the Federation of British Industries; a member of the Board of Trade and many other Parliamentary committees. Mr. Manville is a pioneer both in electric lighting and traction, having been responsible for the electric lighting of Victoria Embankment in the early eighties and also having installed some of the earliest examples of electric tramways, namely those at Northfleet and Newcastle.

member of the legal committee of the General Munitions Board and of the War Industries Board and is one of the counsel of the U. S. Shipping Board, Emergency Fleet Corporation. In June, 1917, he was appointed counsel of the Cantonment Labor Adjustment Commission, and in September of the same year counsel of the Federal Shipbuilding Labor Adjustment Board.

Dr. Royal Meeker, who will be the representative on the commission of the Department of Labor is statistician of that department and Commissioner of the Bureau of Labor Statistics. For five years before his appointment to this position by President Wilson in 1913 he was assistant professor of political economy at Princeton University. Dr. Meeker is an independent thinker and an expert in the investigation and presentation of facts. He has recently had occasion to give particular attention to the electric railway situation because of the publication by the Bureau of Labor Statistics, of which he is commissioner, about a year ago, of an extended report on "Street Railway Employment in the United States." This report contained more than 1100 pages.

Hon. George L. Baker, Mayor of Portland, Ore., whose name was mentioned in the Washington reports as the representative of the cities on this commission, is the chairman of the Organization Committee of the American Cities' League of Mayors and a man of long experience in public service and familiar with conditions on the Pacific Coast.

P. H. Gadsden, the electric railway member, is chairman of the Committee on Readjustment of the American Electric Railway Association, a practical operator of public utility plants for more than twenty years and a close student of the problems of the electric railways.

Charles W. Beall, the representative on the commission of the Investment Bankers' Association of America, is a member of Harris, Forbes & Company, of New York City. He has long been active in the work of the Investment Bankers' Association of America, and is qualified as a financial adviser through many years of experience in investment fields.

W. D. Mahon, the representative on the board of organized railway labor, has been president of the Amalgamated Association of Street and Electric Railway Employees, Detroit, Mich., ever since its organization in 1892. He is a member of the executive committee of the National Civic Federation and also of the American Federation of Labor. In 1914 he made a trip to Europe to investigate electric railway labor conditions but was unable to complete this study because of the outbreak of the war. He has devoted his attention for years to the interests of organized labor.

COMMENTS ON COMMISSION'S WORK

Chairman Elmquist on June 12 issued the following statement in regard to the work of the commission:

"It is the duty of the commission to consider fundamental principles involved in the electric railway situation. Necessarily, the investigation should be upon broad and impartial lines, and it will take some little time to organize the work.

"Perhaps the problem can best be stated in this way—Are the utilities suffering from a disease? What is it? Is it curable? What is the best remedy? How can the public secure the best service at the lowest cost?

"The members of the commission realize that the task before them is not a small one. A sub-committee is at work on the plan of the organization, and its re-

port will be considered by the commission at an early date."

In reply to a request from this paper to other members of the commission to make some statement on the proposed investigation, Vice-Chairman Sweet said:

"The newly appointed Federal Electric Railways Commission is undertaking the difficult task of ascertaining the causes of the present bankrupt condition of many electric railways in the United States at this time.

"While doubtless there are differences in the details of the problems in different cities, there must be some general reasons for a condition that so universal.

"What the procedure of the commission will be has not yet been determined, but its members are convinced that there is some way of discovering the principal causes of the unhealthy condition of these properties and this clearly is the first step toward the discovery and application of a remedy.

"That a suitable remedy will be found is well nigh certain. Whether the electric railways themselves and the urban and suburban communities served by them will be willing to take the remedies that may be prescribed is another question.

"If a commission made up of representatives of associations of bankers, electric railway companies, electric railway employees and representatives of the public, with all their divergent interests, can come to an agreement as to both cause and remedy, it would seem as if the organizations represented by these several members ought to be like minded, and that would mean a very general, practically universal, acceptance of the conclusions that may be reached by the commission.

"Final action, whatever it may be, must be taken by the various state and municipal governments and the electric railway companies. All the commission can do is to ascertain facts, draw conclusions and make recommendations as a basis for municipal and corporate action later on."

Mr. Meeker stated that he was not prepared to say anything in regard to his plans for work with the commission. "I should be very pleased to give a statement to the ELECTRIC RAILWAY JOURNAL," he said, "but anything I might have to say would better come out in the public hearings, which are about to begin."

Don't Talk to the Motorman

ONLY ONE Motorman

is needed to run a car. His individual attention to duty is needed to operate the car with

SAFETY

When we, his fellow workers, are riding with him we should set an example to passengers

Let's Keep Still

National Safety Council • Electric Railway Section

THE accompanying poster, just put out by the electric railway section of the National Safety Council, carries a message that may well be heeded by every employee. It ought to be obvious that distraction of attention from duty is a sure provocative of danger, but nevertheless the fact is not fully realized. The message should be carried also to

well-intentioned, friendly passengers who occupy the front platform of cars.

The Zone Fare in Practice

WEST HAM

Universal Fare Tried for a Brief Period but Abandoned—Present Differential Rates Include No Half-Penny Fares for General Use—Although West Ham Is Located in the Most Typical Labor Borough of London, the Average Earnings Per Car-Mile Exceed 30 Cents with Some Lines Earning 40 Cents or More Per Car-Mile, Despite Low-Rate Workmen's and Children's Tickets

By WALTER JACKSON

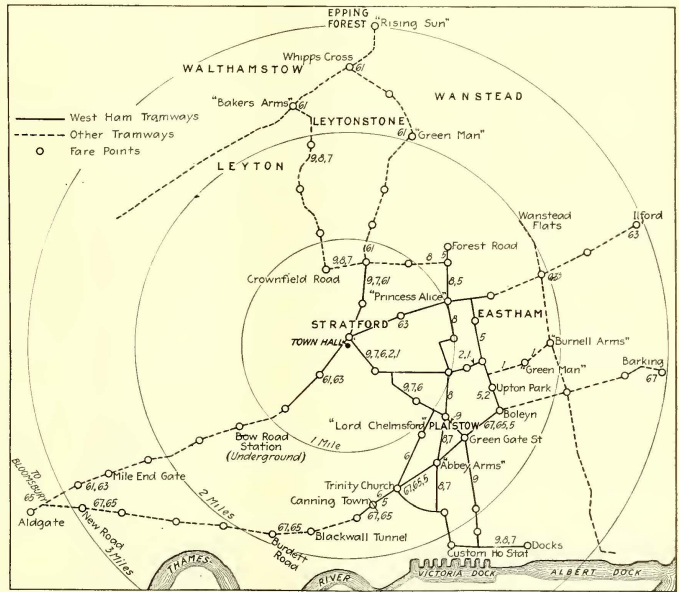
THE County Borough of West Ham, which occupies approximately 7½ square miles, lies in the eastern part of London. West Ham is the great dockyards section of London, and naturally it has been a busy center since the opening of the war. With the exception of some detached houses in the northern part, near Epping Forest, West Ham has no suburban areas. Hence the overwhelming majority of its travel comes from working people, a fact well worth bearing in mind in view of the density of short-haul travel.

In accordance with English characteristics, the big tenement house is absent even in this out-and-out laboring community. Two-story houses are the usual thing with nearly always one family to the house. The vital statistics of the borough show a population of approximately 300,000, with 48,207 houses and a density of sixty-two persons per acre. Like every other community in the United Kingdom, West Ham has its housing plans. Up to the present, however, it has built only eleven one-family houses and 390 dwellings suitable for more than one family. Part of these structures have been erected on sites of condemned property, as at High Street, and part on open ground, as at Plaistow. The real difficulty here as elsewhere is not too much population but too many antiquated dwellings which are not provided with the conveniences essential to decent, comfortable living in the twentieth century.

The trackage owned by the borough tramways within West Ham equals 16.75 miles of route or 30 miles of single track. This does not convey a true idea of the available service, however, as the West Ham Corporation Tramways have through-running arrangements with the London County Council Tramways on the west, the East Ham Corporation Tramways on the east and the Leyton, Walthamstow, Barking and Ilford Urban District Councils Tramways on the north. The routes now operated by the West Ham Corporation Tramways, shown

on the accompanying map, comprise the following (the miles indicated are route-miles):

Aldgate and Barking, Route 67, 7.2 miles long, is operated through a purely working-class district. Before the coal shortage crisis, this line had a two and one-half-minute headway. The present service has a headway of three minutes morning and evening and four minutes at other times. Aside from this liberal service, it will be seen from

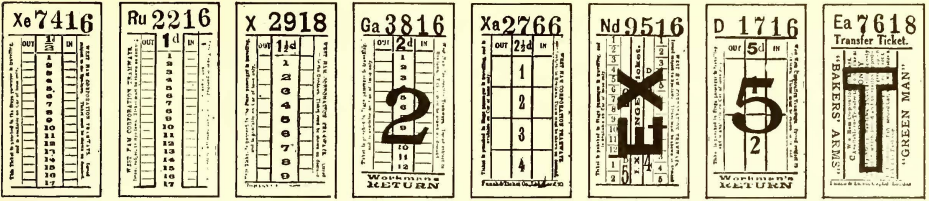


MAP OF THE WEST HAM TRAMWAYS SYSTEM, SHOWING NUMBERED ROUTES AND THE LOCATION OF FARE POINTS

the route map that about 5 miles of Route 67 is overlapped by Route 65 and about 2 miles by Route 5, as described below.

Aldgate and Ilford, Route 63, runs through the business section and also serves the best residential district. It is 7.06 miles long. Like Route 67, the two and one-half-minute service has been changed temporarily to three minutes and four minutes for rush and off-rush hours respectively. On this line, too, 5 miles of the route enjoy an overlapping service.

Aldgate and Leytonstone, Route 61, 7.9 miles long, has a minimum headway of three minutes and a maximum headway of four minutes. Although part of the cars on this line are turned back, the four-minute service is maintained all the way to "Bakers' Arms." This, like several other



WEST HAM TRAMWAYS TICKETS, INCLUDING TRANSFER AND UNIVERSAL EXCHANGE TYPE

increased traffic on account of war activities, the net was going down. As early as January, 1916, the management submitted to the Tramways Committee a report covering three possible ways of increasing the returns from traffic. The first plan, for a universal fare of 1d. throughout the borough for all classes of traffic, was adopted but did not go into effect before June 27, 1917.

Under this plan, familiar enough in the United States, the average ride for 1d. was estimated at 2½ miles and the longest ride at 3½ miles.

Year Ended March 31	Passengers Per Car-Mile	Car-Miles	Passengers Carried	—Gross Receipts— Pence Per £ Total Car-Mile
1914	10.95	3,756,354	41,152,502	142,655 9 11
1915	11.35	3,760,361	42,667,561	151,490 9 66
1916	12.82	3,645,165	46,734,440	163,858 10 78
1917	12.96	3,650,855	47,326,816	165,821 10 90
*1918	12.18	3,592,258	45,764,149	188,452 12 58

*Nine months and four days of universal penny fare.

While the universal penny fare naturally raised the return per passenger (to 1.056d.), it discouraged the old half-penny riders to such a degree that the traffic

actually fell off 7½ per cent during a period of constantly increasing activity. This is succinctly shown in the preceding table.

It would not be fair to blame the principle of the universal fare altogether, as there would surely have been some drop in traffic following any scheme that obliterated the half-penny fare. Yet it is a curious fact that the return to a graded fare, with 1d. tickets and other fractional fares for children only, has been followed by most gratifying increases in traffic and revenue.

Although the nine months to Jan. 2, 1919, include the period from April 1-June 30, which saw the end of the universal fare, they show such increases over the corresponding nine months to Jan. 2, 1918, that banner returns are forecast for the year ended March 31, 1919:

Nine Months Ended	Passengers Per Car-Mile	Car-Miles	Passengers	—Gross Receipts— Pence Per £ Total Car-Mile
Jan. 2, 1918	12.12	2,754,794	33,398,492	145,974 12 79
Jan. 2, 1919	14.26	2,612,867	37,376,966	181,848 16 70

WEST HAM CORPORATION TRAMWAYS.

WAYBILL FOR BAKERS' ARMS DOCKS.

Conductor, W. Black Driver, E. Smith Car No. 38
 Duty No. 65 Punch No. 4234 Date, 19 8 1918

OFFICE COLUMNS				CONDUCTOR'S COLUMNS				
QUANTITY ISSUED	TO	FROM	FIRST NUMBER REFERRED TO OFFICE	QUANTITY SOLD	PAFES	£	s	d
3/6	87	7500	7413 ✓	7416 ✓	73			3 0 1/2
8	201	1100	1200 ✓		1d.			3
1/2	82	5200	5716 ✓	5718 ✓	2			3
1/2	44	7000	7001 ✓	7002 ✓	1			2 1/2
CHILDREN								
B. 703	3000	2927	2928 ✓	2930 ✓	3	4d. Wkm.		6
G	67	0600	6533 ✓	6534 ✓	1	5d. Wkm.		5
						1d. Trans.		
J.	291	6900	6609 ✓	6613 ✓	4	1d. T. Exch.		
						Exchange		
For Office Use only				Tickets Sold				
				Punch Register				
				415		3 13 6		
				412		3 13 6		

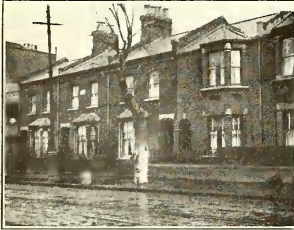
Conductor's Signature, W. Black

CONDUCTOR'S WAYBILL COVERING A FULL DAY'S WORK

The average fare per passenger thus increased from 1.049d. to 1.168d. While a portion of the increase in receipts per car-mile was the result of an enforced cut in mileage, the increases in the number of passengers and the gross receipts speak for themselves. It is estimated by Lewis Slattery, general manager, that the total travel for the year ended March 31, 1919,

is applicable only to small cars and non-congested traffic. The seating capacity of the 118 double-deck cars used (106 of which are single-truck) ranges from sixty to seventy-eight, and the number of passengers per car-mile often exceeds twenty! Here are the figures:

During Christmas week, earnings per car-mile were 24.9d. on Route 2, 22.85d. on Route 67, 22.43d. on Route



Greengate Street, Plaistow



Glasgow Road, Plaistow



Neville Road

THESE HOMES OF WEST HAM WORKERS ARE VISUAL ANSWERS TO "THE ZONE FARE IN ENGLAND CAUSES CONGESTION"

will be approximately 50,000,000 passengers despite a reduction of 250,000 car-miles. For the five weeks ending Jan. 2-Jan. 30, 1919, the total traffic was 4,567,980, of which approximately 69 per cent was in 1d. fares, 15 per cent in 2d. fares, 6 per cent in 3d. fares and 3 per cent in 3d. fares. The armistice has had no perceptible influence on traffic, and as West Ham is a shipping center *par excellence* there is no reason to expect a decline.

At this time, the rates on both tramways and buses in West Ham are practically the same. Although the buses seat but one-half as many passengers as the average West Ham car, they are faster only where exceptionally heavy drayage delays the cars. On Sundays the buses are not in it for speed.

To conclude the data on revenue, the following figures are presented in the solemn hope that they will forever dispel the idea that the differential fare system

is applicable only to small cars and non-congested traffic. The seating capacity of the 118 double-deck cars used (106 of which are single-truck) ranges from sixty to seventy-eight, and the number of passengers per car-mile often exceeds twenty! Here are the figures:

During Christmas week, earnings per car-mile were 24.9d. on Route 2, 22.85d. on Route 67, 22.43d. on Route 63, 19.89d. on Route 7, 18.75d. on Route 61 and 24.86d. on Route 67. These routes furnished 13,215 car-miles for 268,927 passengers, and therefore carried twenty passengers per car-mile.

For the week ended Jan. 2, 1919, the car-mile earnings were 22.7d. on Route 2, 20.2d. on Route 67, 20.2d. on Route 63, 17d. on Route 7 and 19.07d. on Route 61. These figures indicate traffic conditions now.

PRESENT FARES AND NUMBERED STAGE TICKETS

Under the revised system of differential fares following the discarding of the universal fare on June 30, 1918, the lowest fare, except for children, remains 1d. All fractional fares such as 3d., 1 1/2d. and 2 1/2d. apply only to children, who are entitled to ride at half rates if between the ages of five and fourteen years. Workmen cannot buy anything less than a 2d. return ticket. The abolition of the half-penny intervals is in

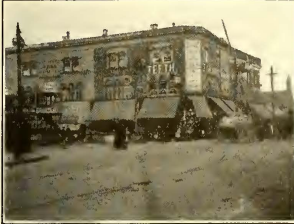
WEST HAM CORPORATION TRAMWAYS.														
DAILY TRAFFIC RETURN for _____ day of _____ 191_____														
Mile Lost	ROUTE	No. of Receipts	No. of Passengers	No. of Passengers	Mile Rate	Average Receipts per Mile	Average Receipts per Car-Mile	Average Receipts per Car-Mile	TOTAL RECEIPTS	Corresponding _____ last year				REMARKS
										Over	Under	Receipts	Passengers	
	Aldgate and Ilford													
	Aldgate and Green Street													
	Wanstead Flats and Poplar													
	Wanstead Flats and Boleyn													
	GRAND TOTAL													
	Thermometer													Net Increase
	Barometer													Not Decrease
	Weather													

HEADINGS OF DAILY (AND WEEKLY) TRAFFIC RETURN FILLED OUT BY THE TICKET DEPARTMENT ROUTE FOR ROUTE AND TOTALIZED

consonance with the action of the tramways and the bus companies in the east end of London.

As arranged now, the general plan is to give three half-mile stages for 1d., each stage forming a starting point so that the conductor is expected to collect the fare within the first half-mile after the passenger has boarded the car. Of course, the arrangement of stage

go through on Sundays and holidays from Whipps Cross Junction to either the "Baker's Arms" or the "Rising Sun," two of the gratuitously advertised inns. The passenger who knows no better would have to buy a second ticket for a penny in order to complete his journey on the second car, but nearly every passenger names his destination and, if necessary, he gets a



Forest Gate



Romford Road, East Ham



Green Street

NEITHER BUSINESS NOR RESIDENTIAL STRUCTURES ARE BUILT HIGH ENOUGH TO SCRAPE THE SKY OVER WEST HAM

lengths and numbers is not absolutely hard and fast. There are cases where the passenger gets two stages for a penny and other instances where he gets four. Full-rate fares are 1d., 2d., 3d., 4d., 5d.; and workmen's fares, 1d. for a single trip (in area of London County Council only) and 2d., 3d., 4d. and 5d. for a return (round) trip. On the whole, the increase in fare to the lowest-rate rider was 100 per cent and to the others about 50 per cent.

A feature which contributes greatly to the simplification of the tickets is the numbered designation of the stages for each rate of fare as the illustration on page 1165 shows. This makes it possible to use one size of ticket for every rate of fare, the differences being prominently indicated partly by color and partly by surprinting the workmen's return tickets, which have the same color as regular single tickets of like denomination. The stages or zones are indicated by a single row of figures down the center of the ticket, the conductor punching the space opposite the number on the "in" or "out" side as the direction of travel demands. Any uncertainty as to what stages the zone numbers represent can be settled at once by reference to the "Fares and Stages" placards which are posted in every car, separate red-bordered placards being used for workmen's, local and through rates. A specimen local placard is reproduced herewith. Only the fractional fare children's tickets are issued and canceled as such; on others the conductor is permitted to advance the number of stages by punching.

When the holder of a workmen's ticket presents it for the return journey, he receives an "exchange ticket" therefor. In order to avoid the issuance of too many special tickets, the West Ham Corporation Tramways uses a single type, devised by William Hopkins, principal assistant, with which one punching serves for the stage designation and another punching for the price of the original ticket. A ticket inspector by comparing price and stage numbers can tell at once whether the passenger is over-riding. In accounting for tickets, the workmen's return tickets collected must equal the number of exchange tickets issued for them.

A transfer ticket is also used to a limited extent on one line, Route 61, where some of the cars do not

transfer ticket in addition to the usual ticket covering the ride to Whipps Cross. This ticket carries the customary identifying letters and serial numbers but no date or other time marking. The slight extent of this transfer traffic, however, makes no elaborate checking necessary.

Because of the compactness of the territory of the West Ham Corporation Tramways, only one operating carhouse is used—a circumstance which helps greatly to simplify the handling of tickets and cash. In fact, the receiving department where the tickets are made up and the returns checked is in the office building adjacent to the depot.

Conductors, therefore, obtain their supplies without the formality of making out personal requisitions which

WEST HAM CORPORATION TRAMWAYS.

ALDGATE AND BARKING ROUTE.

Conductor's Name _____ Date _____
 Car No. _____ Duty No. _____ Journey No. _____
 Time leaving Aldgate _____ a. m. _____ p. m.

Stage Points	Children's Tickets		Single Journey Tickets				Workmen's Single		Workmen's Return Tickets	
	1d.	1d.	1d.	2d.	3d.	4d.	1d.	2d.	3d.	4d.
Aldgate										
Baldwin Street										
Brentley Street										
Burton Road										
Green Street										
Blackhill Station										
Greenwich Road										
Trinity Church										
Albany Arms										
Greenwich Street										
Green Street										
Barking Roadway										
Brentley Bridge										
East Ham Time Hall										
Green Street										
Greenwich Street										
Albany Arms										
Trinity Church										
Greenwich Road										
Blackhill Station										
Aldgate										

* When the Conductor going on return must punch his starting number, and the Conductor coming on duty at 100 must punch his starting number.

THE STARTING NUMBERS OF ALL TICKETS IN USE ON JOURNEY MUST BE ENTERED BEFORE LEAVING ALDGATE, AND FINISHING NUMBERS AT ALL STAGE POINTS THESE COLUMNS ARE LEFT BLANK.

FORM FILLED IN BY CONDUCTORS IN SEMI-ANNUAL SURVEY OF TRAFFIC ON JOINTLY-OPERATED ROUTES

must be filled from auxiliary stockrooms. Instead, they turn over to depot inspectors boxes containing their cash, tickets, punch and waybill. The depot inspector counts the money in their presence and gives them receipts. Duplicates of these remain in the receipt book, which is sent to the receiving department at the end of the day. The conductors are supposed to make blind returns, but most of them are known to see pretty clearly! On beginning the next day's work, each conductor receives a second box containing another punch, a waybill and a complete supply of tickets in accordance with his probable requirements.

If, perchance, the conductor does run short in the course of the day, he is at liberty to borrow a pad of tickets from some other conductor. This is easy enough as the tickets of one denomination are always alike no matter where used. The West Ham Corporation Tramways does not print its own tickets and so does not feel like going to the further refinement of printing route or service numbers on the tickets. This would mean ordering and storing a much greater supply of tickets and involve too much dependence upon the printer sending stock in exactly as wanted. Incidentally, it may be remarked that the universal, numbered ticket has justified itself as a war measure in the saving of paper.

The all-day waybill is another feature that has been adopted to reduce the labor in connection with fare accounting from the car to the cashier. Individual trip waybills have been discarded as involving too much

Wm. S. ... Point
Blackpool, Lancs.
Day *Wednesday* Van *126* 191*9*

Service No.	Car No.	Time TO London	Service No.	Car No.	Time FROM London	Remarks
11	126	8.20	11	126	8.24	
11	126	8.22	11	126	8.28	
11	126	8.24	11	126	8.30	
11	126	8.26	11	126	8.32	
11	126	8.28	11	126	8.34	
11	126	8.30	11	126	8.36	
11	126	8.32	11	126	8.38	
11	126	8.34	11	126	8.40	
11	126	8.36	11	126	8.42	
11	126	8.38	11	126	8.44	
11	126	8.40	11	126	8.46	
11	126	8.42	11	126	8.48	
11	126	8.44	11	126	8.50	
11	126	8.46	11	126	8.52	
11	126	8.48	11	126	8.54	
11	126	8.50	11	126	8.56	
11	126	8.52	11	126	8.58	
11	126	8.54	11	126	8.60	
11	126	8.56	11	126	8.62	
11	126	8.58	11	126	8.64	
11	126	8.60	11	126	8.66	
11	126	8.62	11	126	8.68	
11	126	8.64	11	126	8.70	
11	126	8.66	11	126	8.72	
11	126	8.68	11	126	8.74	
11	126	8.70	11	126	8.76	
11	126	8.72	11	126	8.78	
11	126	8.74	11	126	8.80	
11	126	8.76	11	126	8.82	
11	126	8.78	11	126	8.84	
11	126	8.80	11	126	8.86	
11	126	8.82	11	126	8.88	
11	126	8.84	11	126	8.90	
11	126	8.86	11	126	8.92	
11	126	8.88	11	126	8.94	
11	126	8.90	11	126	8.96	
11	126	8.92	11	126	8.98	
11	126	8.94	11	126	9.00	

INSPECTOR'S REPORT ON ADHERENCE OF WEST HAM AND FOREIGN CARS TO SCHEDULE

detail for all concerned. The present waybill, reproduced on page 1165 carries on its face the identification of the crew, the duty (run) number corresponding to the box number, the car number and the date. In the first three columns the girl who fills the ticket box writes in the letters, quantities and serial numbers of the tickets issued. In the remaining columns, the conductor records the top numbers of the tickets returned, the number and the value of each denomination sold and also the total tickets sold. The back of the waybill shows the commencing number of the tickets on each trip and the time the car left, both written in by the conductor. In practice, cash is not turned in every trip but on the completion of duty.

The receiving department is in charge of tickets, punches, waybills, cash, etc., its functions extending from the reception of new tickets to the making out of the daily (and weekly) traffic returns by routes for the several items reproduced in the form on page 1166. All cash goes to the bank, but the borough treasurer is responsible for such audits as are made from time to time. The cash as turned in to the receiving department by the depot inspectors does not come with the boxes of the individual conductors but is already made up into half-penny bags containing 2s. 6d.,

penny bags containing 5s. and bags of silver coins containing 45s.

The total cash received from each depot inspector must, of course, tally with the total of the individual receipts turned in by him. It need not tally with the totals on the waybills themselves, as the latter are sure to have some shorts and overs for which the conductors are responsible. Shorts are made up out of wages instead of on the spot, since the inspector merely receipts for money deposited and does not check either the waybill or the tickets. Overs are retained.

For each duty number three boxes are used, namely, one for Mondays, Wednesdays and Fridays; a second for Tuesdays, Thursdays and Saturdays, and a third for Sundays. As far as practicable, the tickets for each duty number are issued in rotation. There are 180 regular duty numbers, making 540 boxes. A punch does not go necessarily with all the boxes in reserve, as the number of punches is 430 in comparison with 230 conductors and 540 boxes. The punches are rented from the Bell Punch & Ticket Company at a figure which includes maintenance and transportation of repaired punches back and forth.

The receiving system described demands eight girls for filling boxes, making out and checking waybills, handling cash, preparing traffic records, etc.; one girl for emptying punches and making counts occasionally, resetting the punches and resealing them, and the executive—or ten in all. The head of the receiving department states, however, that three girls could be dispensed with if no record were kept in a detail stock book of the duty numbers to which the tickets are assigned. This information appears on the waybills in any event, and its transfer to the tally book is in accordance with a requirement of the borough authorities. Two calculating machines are used in this department.

The depot inspectors, who hand out and receive boxes and count cash as described, number only six, four of whom are on duty throughout the day, five during rush hours and two at night. These men are really depot clerks or dispatchers, as they serve also as timekeepers, check signing on and off, etc. It is stated that not one of these men could be spared in case the universal fare were used. In fact, during the period that the West Ham Corporation Tramways operated on a universal fare, fare receipts were given exactly as under the differential fare system, as it was felt that the conductor ought to have an interest in seeing that the passenger paid his fare and the passenger ought to have evidence that he had paid it.

For checking conductors and examining passengers' tickets, ten men are employed. They are not used exclusively in ticket-inspection service, since traffic regulation along the line is also part of their duty. These

LEWIS SLATTERY, general manager West Ham Corporation Tramways, has had the benefit of experience in almost every kind of tramway operation from horses and compressed gas to electric conduits and overhead trolley. During his eight years as general manager of the Blackpool, St. Anne's & Lytham Tramways he did considerable pioneering with compressed gas cars, being the first operator to try them. On leaving Blackpool, he became general manager of the Oldham Corporation Tramways, and still later he was traffic manager of the London County Council Tramways for five and one-half years. Mr. Slattery has been general manager at West Ham since October, 1916, during a period replete with problems of man and equipment shortage in a district where the war made great demands for service under peculiarly arduous conditions.

men board about six cars an hour or sixty a day, the number of checks per conductor running up to four or five a day. The conductor attests the inspector's visit by his signature.

As previously mentioned, the average schedule speed of the West Ham Corporation Tramways is 7.66 m.p.h. The heavy drayage in the West Ham district is a serious factor—serious enough, in fact, to warrant prosecution of vehicle owners when their wagons break down because of defective equipment! This is a view of the situation that ought to interest the American operator.

The distances between stops are considered to be unnecessarily short, the spacing in West Ham being five poles or 600 ft. The only compulsory stops are those established by the Board of Trade, and these do not include fire station or school stops but simply places where the physical conditions are unfavorable. Optional stops are shown by blue signs, and compulsory stops by red ones. By order of the Metropolitan District police, who control the area 12 miles from the center of London, car stops are made on the far side to avoid danger to intending tram passengers from the buses, which stop on the near side.

In addition to the ten inspectors, who inspect tickets and regulate traffic along the line, the West Ham system employs eighteen traffic regulators who are stationed at the more important traffic control points. These men order cars to start while the conductors are already collecting fares, and they help to maintain orderly loading at the dockyards and other heavy traffic centers. No space is available for prepayment areas. All entrance and exit on cars is via the rear platform except at terminals.

An illustration on page 1168 shows the style of report made by traffic regulators on the adherence of cars to schedule. In this report the letter "E" designates East Ham cars, "L" the Leyton cars and the four-numbered cars the rolling stock of the London County Council Tramways. The remaining numbers are understood to refer to West Ham cars.

SEMI-ANNUAL TRAFFIC SURVEY DETERMINE DIVISION OF EARNINGS

Semi-annually a detailed seven-day traffic survey is made on the joint Route 67 in order to make a fair division of earnings. For this purpose, the conductor is asked to enter the finishing numbers of his tickets at all stage points left open for that purpose on a form of the sort reproduced. The traffic regulators check this tally by boarding the cars and examining the way-bills at the points specified. Joint Routes 61 and 63 are deemed to be of equal earning power throughout their length.

The telephone control system of the West Ham Corporation Tramways is one of its most important factors in traffic control. It will be discussed in a separate article.

Like other British tramways, the West Ham system has a large proportion of women conductors. Conductresses are paid at the rate of 11 $\frac{1}{2}$ d. an hour, which averages £2 18s. 3d. (approximately \$13.98) a week. Motormen and conductors who received 7 $\frac{1}{2}$ d. an hour or £1 16s. 3d. for six-day periods before the war are now paid £3 6s. 3d. (\$15.90). Time at one and one-quarter is paid to employees who work on their rest day, Sundays or overtime. After six months service a platform employee is entitled to three days vacation with pay, and after twelve months service to

six days in addition to one day off as an equivalent for each of the public holidays such as Christmas, Boxing Day, Easter, Good Friday, Whit-Monday and August Bank Holiday.

Regulars have the same run for a week at a time, taking an early run one week, as from 3.45 a.m. to 1 p.m., and the next week from 1 p.m. to 11 p.m. Out of ten hours, about nine hours are actual platform time. Substitutes take over the duty of the men replaced, but reliefs are on a different run every day in rotation.

W. H. Taft on Higher Fares

In Newspaper Article He Gives Reasons for Their Advance—Remedy for Existing Conditions Must Be Found

IN A COPYRIGHTED article in the Philadelphia *Public Ledger* for the morning of June 12 Ex-President William H. Taft contributes an article entitled "Higher Street Car Fares Seem to Be Inevitable." He begins by saying that while the financial situation of the general steam railroad system of the country is bad enough, it is far better than that of the electric street and suburban railway systems. After pointing out that the long use of the nickel fare has trained the public to regard anything more as an infringement upon its rights and privileges, he points out that "5 cents under present conditions is generally not reasonable compensation for the service rendered in any city." Even before the war, materials were increasing in price, and labor had been kept down simply through the necessity of circumstances of the street railways.

Ex-President Taft then gave the reasons for the organization of the National War Labor Board whose position was that wages were not a subject which could be affected by the question of profit of operation, but must be governed by the range of wages for similar service in the same community and by minimum limitation as to the cost of living. While the increases in wages awarded by the board added to the necessary expenditures of the railway companies, the board recommended in every case that an increase in fares was only just to the owners of the street railway companies. Mr. Taft then discusses the question of municipal ownership with and without losses made up by taxation, but does not recommend either plan. In conclusion he says:

"But whatever the remedy to be undertaken, the condition of investments now reaching at least \$5,000,000,000 in the country is so serious that public attention should be aroused to the necessity of devising ways and means to meet the crisis."

Reduction of Ash Content in Screenings

In a paper presented by the general fuel inspector of the Illinois Central Railroad at the 1919 convention of the International Railway Fuel Association, the statement is made that the ash content of screenings can be reduced nearly to that of the screened lump by the use of a jig gravity washer with an ample water supply and located in a place convenient for depositing the refuse. For example, in the case of a coal from one mine in the Central West the dry or unwashed screenings contained 22.6 per cent ash and 8895 B.t.u. per pound. By washing, the ash was reduced to 14.1 per cent and the B.t.u. content increased to 10,085. The lump coal contained 12.4 per cent ash and 10,499 B.t.u.

Safety Car Is a Live Proposition*

This Type of Equipment in Both Large and Small Cities Will Give Better and More Frequent Service

By P. J. KEALY

President Kansas City (Mo.) Railways

THE safety car is a subject which is now occupying the attention of operators of both small and large properties and which merits all the study being given to it. While not thinking it is the solution of all our difficulties, I do believe it is destined to be the largest single factor from the operating standpoint in meeting the present transportation problem.

In Kansas City we are not yet prepared to say from our own actual experience that the car, as we now know it and as it is being standardized by its makers, is all that it should be. It is still subject to refinements and changes, which it is hoped will be developed and worked out by the car builders. But the idea is right and it has come to stay, and in many cases will save the situation.

2500 SAFETY CARS NOW IN USE

A report of the American Electric Railway Association, issued as of April, 1919, shows that there are at present eighty companies, serving a population of four million, operating more than 2500 safety cars. More than half of the companies reporting are 100 per cent one-man operated. This report is very instructive as showing the economies and the increase in net which result from safety-car installation. The average reduction in power consumption was over 50 per cent, this figure covering many cars using old-style motors. For the safety-car alone this reduction is 60 per cent. Practically all of the companies report reduction of headway and increased service. Forty-one companies, including those operating in the larger cities, show increases in revenue—in some cases running as high as 35 per cent. Practically all of the companies show a decrease in accidents, especially boarding, alighting and platform. Most of the companies reporting are satisfied with the results obtained and advocate the extension of the safety-car service.

There is a factor, however, which may have an adverse effect on the general introduction of the safety car. That is the introduction of the zone system. There seems to be a tendency on the part of commissions in many states to favor a zone system of fare collection. If generally introduced throughout the country, it may make difficult the use the one-man car, especially in the larger cities having a number of zones. The operator of the safety car now has his hands full with the collection of a single fare, and I doubt very much if he would be able to attend in addition to the collection of zone fares. Nevertheless a number of the companies reporting use this car in connection with the zone system and collect fares by means of inspectors, the pay-as-you-leave plan or by stoppage of the car and collection at the zone limit. The fact, however, that any system of zone collection by the

operator of a safety car would tend to slow up the speed to a great extent might make its operation under this system impracticable on heavy lines.

SAFETY CARS SATISFACTORY IN KANSAS CITY

Safety cars have been used in Kansas City since April 27 with very satisfactory results. Twenty-five cars were bought with the idea of using them on a light-traffic crosstown line. It was later decided to put them in regular service through the congested district and give them a thorough trial so as to demonstrate once and for all whether or not this type of equipment would meet the extremely difficult operating conditions prevailing in Kansas City. Naturally the results are not entirely comprehensive, owing to the fact that the line could not be completely equipped with safety cars. The results obtained to date, however, are so gratifying that their extension to other lines in Kansas City may to some extent help solve present operating and financial problems.

The cars in Kansas City are being given a thorough trial on the Sunset Hill line. This line is 7 miles in length, serving the downtown district, the thickly populated residence district south to Forty-eighth Street, and from there on private right-of-way through the most exclusive residence portion of the city. In the downtown district the route is over Grand Avenue, which carries exceedingly heavy traffic with a headway on portions of it during the rush hour of from thirty to forty-five seconds. This line has the usual heavy grades to be found on all lines in Kansas City, and it was felt that if the safety cars could operate successfully over this line and maintain schedules headway in connection with the heavy equipment through the congested district, they could be placed anywhere.

Formerly on the Sunset Hill line during the rush hour twenty of the large cars were used, which gave approximately a four and a half minute headway. During the non-rush hours it was served by fifteen of the large cars, giving approximately an eight-minute headway. Beginning April 27 a rush-hour service was begun with fifteen of the safety cars and ten of the large ones, with between two and one-half and three minutes headway. During the non-rush hours fifteen safety cars give between a four and one-half and five-minute headway. Here are the results of this operation for the first two weeks as compared with the two weeks prior to the introduction of the safety cars:

Car miles were increased	47 per cent
Car hours were increased	54 per cent
Gross receipts increased	19 per cent
Expenses increased (only power and platform being considered)	11 per cent
Net revenue gained	25 per cent
This revenue gain is at the rate of about \$2,000 per year per car	

Actual power-saving, running-time and stop tests were made on one of the safety cars on this line as

*Abstract of paper before meeting of Missouri Association of Public Utilities, Excelsior Springs, June 6, 1919.

compared with one of the large type. These tests gave the following results: The running time of the large car was forty-three minutes as compared to forty-four for the safety car. The time per stop in seconds for the large type was seven and seven-tenths as compared to ten seconds for the safety car. Stops per mile were seven, the same for both cars. The coasting percentage of the large car was 15.4 as against 24.1 for the safety car. The kilowatt-hour consumption per car-mile was 3.45 for the old type equipment and 1.39 for the safety car, showing a saving of 60 per cent. It will be seen from the foregoing that although the time consumed per stop for the safety car was 2.3 seconds longer, its running time was practically the same.

Twenty-five safety cars are now in operation in Kansas City, and five more are being built. When the line is completely equipped with safety cars, even should there be no further gain in gross receipts, the further reduction in operating expense will show a gain of \$2,000 per car per annum, or a yearly net revenue gain for this one line of approximately \$60,000. At this rate the cars would pay for themselves in less than three years.

Owing to the more frequent service it is interesting to note the gain in gross receipts on the Sunset Hill line as compared with the entire system. As compared with the same day of the preceding week, the first week's operation of the safety cars showed a 12 to 32 per cent gain in gross receipts for this line as compared to a 2 to 12 per cent gain in gross receipts on the entire system.

On the Messanie Street line in St. Joseph, where safety cars have been operated entirely since November, 1918, March of this year showed an increase of 26 per cent in gross revenue over March, 1918, and April of this year an increase of 23 per cent over the preceding year. The increase in car-hours and car-miles was approximately 10 per cent. Platform expense with two-man operation was \$98 a day as compared to \$65 per day with safety cars. The power saving would be anywhere from 50 to 60 per cent. These are very hopeful evidences of what may be expected by the general introduction of safety-car operation. Similar statistics might be quoted from every city in which these cars have been placed in service.

As for the car rider, there is not only rapid service with short headways but another feature which should please him. The cars will carry with a fair degree of comfort a load of sixty, thirty-five seated and twenty-five standing. In Kansas City we have adopted this as a maximum load, and when capacity is reached a "Car Full" sign is displayed. Therefore a passenger knows beforehand what will be the maximum crowd limit. He knows that after the car has been filled it will not stop to squeeze in a few more people, greatly to his discomfort.

FURTHER IMPROVEMENTS POSSIBLE

From the standpoint of construction there is a feeling on the part of some that the safety cars have been built up to date with standardization too strongly in the minds of the builders. The car is still subject to a number of changes and refinements. It may have to be strengthened in some of the essential particulars, which may necessitate the addition of slightly more weight, or the use of better material.

It is likely that in increasing safety-car operation in Kansas City, future cars will follow to some extent

J. M. Rosenbury's compromise cars in Wichita, especially in regard to weight and slightly heavier construction throughout. These cars weigh 16,000 lb. and seat forty-one passengers. They are slightly larger than the present type, and in many essential points are built of heavier material.

The makers have also standardized on a width of 8 ft. In Kansas City the track centers will allow for the operation of more than a 9-ft. car. The reason advanced by the makers for adopting 8 ft. as standard is that there are many smaller cities in the United States which cannot take anything wider. This being the case, there is no reason why Kansas City and other cities should be penalized by the limitations of other places. Some additional width would greatly increase the riding qualities of the car, allow a wider seat and a wider aisle. It may be, therefore, that it will be necessary in the future to standardize on at least two widths of cars.

It will also be necessary to line the cars and put in a double floor in order to make it possible to heat them in the latitude of Kansas City. As now turned out without lining, it will be very difficult to heat the cars with any degree of comfort.

Owing to the light construction of safety cars, rigid inspection and proper maintenance will have to be insisted upon in order to keep them in good operating condition. Otherwise it will not take long under severe conditions to have the cars in the shops too great a proportion of the time.

In connection with these matters, I wish to quote from a letter by W. G. Gove, superintendent of equipment Brooklyn Rapid Transit Company, which has just placed an order for 200 safety cars. In writing him I made some of the foregoing suggestions, and he replied as follows:

I think all of your comments as to the light construction of the car, difficulty in heating and fear as to possible future heavy maintenance costs are well taken. We are making an effort to anticipate these features by strengthening and adding to the weight of the car, believing that some additional weight will be money well-expended in the long run. Yet it is my frank opinion that the use of a safety-car will more or less revolutionize the prevalent notions as to the method to pursue in building and repairing cars, and perhaps in the long run it will be found desirable to make them more like a Ford car, and in case of serious accident scrap the body or the complete unit if necessary.

Mr. Rosenbury, who designed the first cars, seems to think on the contrary that the present car is heavy enough and that the objections mentioned can be met by the use of better material. He says:

With regard to the fear entertained that the extremely light construction of the car will result in an extraordinarily high maintenance cost after two or three years of operation, it is my belief that such fears are groundless. Instead of any weight being added to the car, the proposition resolves itself into an engineering problem of maintaining the present extreme light weight and even going to a lighter weight. If any greater strength is needed than that in the present car, it can easily be secured by using higher grade material for the main members of the car, such as dropper bars, sill angles and various other members of the frame. These can be made of pressings from vanadium steel, which will increase the strength of the car and also reduce the weight.

The next thing to be considered in connection with reducing maintenance cost would be to use side girder tank made of American ingot iron instead of the ordinary tank steel now employed. This would result in preventing rust spots, which may possibly weaken the present sheets if not kept thoroughly painted.

Our engineers have made a number of minor criticisms. These are, it is true, but trifling. On the

other hand, they have an important bearing from the standpoint of introducing a new type of equipment to the public. In viewing a radical departure from the ordinary type the public is naturally hypercritical, and little details, such as poor painting, etc., lead to adverse opinion.

The criticisms and suggestions above mentioned, however, are matters of construction detail which can and doubtless will be worked out as operators generally begin to dig into specifications for their own requirements. The fact remains that safety-car operation offers a financial solution for many of our problems. It provides the means for giving the public a better and more frequent service. It allows us to meet peak-load conditions and adjust non-rush service to non-rush income without penalizing the rider. It cuts down the expense of power and track maintenance. The general introduction of the little cars will practically solve the ever-present wage problem in that the wages of the operator can be increased to a point that will fairly well satisfy him without throwing the road into the hands of a receiver.

Everything points to the fact that this is to-day one of the liveliest propositions before electric railway operators of this country, and it merits earnest attention and thorough study. In addition to saving our "financial bacon," this type of equipment will allow us in both small and large cities to adapt transportation facilities to the public demand under all conditions. It gives us the means to provide the public with frequent service, which, after all, is the answer to the urban transportation question in every community.

Short-Line Railroads Confer

Resolution Adopted in Regard to Freight Contracts of Interurbans—Important Conference with Railroad Administration

MORE than 400 delegates of the American Short-Line Railroad Association, representing 600 short-line railroads throughout the United States, held a convention in Washington, D. C., on June 3, 4 and 5. Representatives of electric railways were present in connection with freight traffic matters.

The following resolution was presented to the committee on resolutions and adopted:

Resolved, That the following proviso of Section 1 of the act of March 21, 1918, providing for the federal control of railroads, should be repealed in the bill that will soon be considered by Congress making appropriations for the railroads under federal control, to-wit:

"Provided, however, that nothing in this paragraph shall be construed as including any street or interurban electric railway which has as its principal source of operating revenue urban, suburban or interurban passenger traffic, or sale of power, heat and light, or both."

Resolved, further, that any short-line railroad doing a general transportation business and connecting with or competing for traffic with a railroad under federal control shall be eligible to make a contract with the Director General of Railroads irrespective of the motive power used by said short-line railroad.

BETTER TREATMENT FOR INTERURBANS

At a conference held on June 4 with Messrs. Thelen and Niles of the United States Railroad Administration, a request was made in behalf of electric lines for the same consideration from the steam railroad lines under government control as is being accorded the short-line steam railroads, through contracts being executed between the short lines and the lines under control. The

members of the presentation committee present were Charles L. Henry, president Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.; Dana Stevens, vice-president Ohio Electric Railway, Springfield, Ohio, representing W. K. Schoepf; Edwin C. Faber, vice-president and general manager Aurora, Elgin & Chicago Railroad, Aurora, Ill.; and C. E. Thompson, assistant to president Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., who represented Britton I. Budd.

Other electric railway men present were George Theis, Jr., president, and Chester I. Long, general attorney, and Fred C. Mayer, traffic manager, Arkansas Valley Interurban Railway, Wichita, Kan.

Among the subjects considered at the conference were the following:

1. Proper divisions of traffic.
2. Reimbursement on account of freight and express business diverted because of government control of trunk lines and express companies.
3. Physical connections of electric lines with steam lines where proper.
4. Exchange of transportation as per I. C. C. regulations.
5. Two days free allowance to electric lines receiving steam line cars for loading or unloading.
6. Through rates and traffic relations, and a general co-ordination of electric and steam line facilities for the benefit of the companies and the public, the latter being entitled to improved transportation service, wherever possible, by such co-ordination. Whether formal contracts with the Railroad Administration should be entered into is a question to be considered. The Arkansas Valley Interurban Railway has already made application for such a contract and has joined the American Short Line Railroad Association.

The fact that some of the steam roads under government control have shown a disposition to co-operate with the electric lines, while others have not, would seem, it was said, to indicate the desirability of a uniform policy of co-operation. This it might be possible to establish under a general order of the Director of Public Service of the United States Railroad Administration.

The establishment of the principle of recognition of the interurban railways by the steam railroads, it was felt, is a matter of importance to all such electric carriers. It might be possible now, while the steam railroads are within government control, to have a principle adopted that would be of value to the interurbans generally in the future, for passenger as well as freight traffic.

New Patents Granted for Catenary Suspensions

Several new patents relating to overhead line material are referred to in *Elektrotechnik und Maschinenbau* of Jan. 5. A patent granted to the Allgemeine Elektrizitäts-Gesellschaft provides methods of suspending two catenaries over a track when heavy current renders two wires desirable. These are hung in such a manner that the wires can be independently moved sideways. An Austrian patent granted to the Siemens-Schuckert Works provides for automatically adjusting the tension in the overhead conductor caused by variations of temperature.

Other patents referred to provide methods of suspending the overhead catenaries for two parallel tracks, method of hanging wires and special section insulators and a method of taking current from fixed overhead points by means of a wire stretched along the length of the train above the roof.

New York Association Gets Down to Fundamentals

At Annual Meeting, Held at Lake George, the Local Fare Situation Was Considered in Detail—E. A. Maher, Jr., Was Elected President

THE thirty-seventh annual meeting of the New York Electric Railway Association was held at the Fort William Henry Hotel, Lake George, on June 7, with 150 or more persons in attendance. The morning was devoted to the president's address, reports of committees, discussion of the fare situation and the presentation of a paper on "Workmen's Compensation from the Self-Insurer's Standpoint" by O. G. Brown. In the afternoon there were various sports and other entertainment, and in the evening a very successful banquet.

A SHEAF OF INTERESTING COMMITTEE REPORTS

After the reading by President H. B. Weatherwax, Schenectady Railway, of his presidential address (abstracted elsewhere in this issue), the secretary-

the committee looking toward the correction of the condition thus brought about. It was decided therefore that the effort to secure relief should be continued.

The bill known as the Carson-Martin bill was introduced in the 1919 Legislature, giving the Public Service Commissions the jurisdiction in fare cases which the Court of Appeals in the Quinby decision had declared to be lacking. This measure received considerable support and passed the Assembly but failed of passage in the Senate. Shortly after the adjournment of the Legislature the committee requested the Governor to appoint a commission of citizens to make a study of the traction situation and report to him its recommendations for remedial measures. To this the Governor replied that the public service commissions are already organized to make such recommendations and



MEMBERS AND GUESTS OF NEW YORK ELECTRIC RAILWAY ASSOCIATION ASSEMBLED IN CONVENTION AT FORT WILLIAM HENRY HOTEL, LAKE GEORGE

treasurer, William F. Stanton, New York State Railways, Rochester, read the report of the executive committee and his own report. These showed that the activities of the association for the past year had been directed largely to the bettering of the financial condition of the companies throughout the State. The usual quarterly meetings were omitted in the interest of economy. The receipts during the year have been \$6,064.39 and the expenses \$5,719.48, the surplus increasing the balance from \$6,612.33 to \$6,957.24 during the year. Of the assets \$3,000 is invested in Liberty Bonds.

The committee on ways and means to produce additional revenue, reported that a meeting of the association had been called on April 29, 1918, to present the then fare situation in the State. The Court of Appeals had denied the jurisdiction of the Public Service Commissions over rates named in franchises, and the Legislature had failed to enact legislation prepared by

suggested that the committee appeal to them. This has since been done.

Among other matters the committee reported that the publicity campaign directed by Ivy L. Lee has been continued in curtailed form; that it had recommended through the association the intervention in the Buffalo case before the Court of Appeals of companies in other cities situated like the International Traction Company; that all electric railways in the State should join in a motion for the rehearing of the Quinby case; and that the efforts of the committee to co-operate with the Conference of Mayors and Other City Officials of New York State in recommending legislation concerning utilities had not been fruitful, due to the decision of the committee of the conference appointed to draft a bill to permit municipal ownership of utilities not to broaden its scope to include other legislation.

The committee summarized the fare situation by stating that six cities in the State are now collecting a

7-cent fare and twenty-one cities a 6-cent fare. It was necessary that sixteen cities waive franchise grant restrictions to permit fare increases.

In conclusion the committee recorded its sorrow and sense of loss in the death of Horace E. Andrews and stated that T. C. Cherry, Syracuse, had been appointed to succeed him.

For the committee on military operations, James P. Barnes, Schenectady Railway, reported that up to the time of the armistice no call had come from the adjutant-general in response to the association's offer of its services. The plans for the use of electric lines in the mobilization of troops had been deferred until the adjutant-general worked out a detailed arrangement, and consequently the year 1918 was simply one of watchful waiting for the committee. Mr. Barnes recommended that the committee now be discharged.

The committee on classification of accounts reported by J. C. Collins, chairman, that a conference was held in Albany on June 25, 1918, and a plan was adopted for presenting to the Public Service Commission the views of the association regarding the proposed classification. At a subsequent hearing papers were read and verbal arguments were presented in support of these views. As a result the commission so modified the classification as practically to meet the wishes of the association.

STANDARDIZATION OF SMALL AND LARGE CARS

The report of the committee on standards, submitted by W. G. Gove, Brooklyn, suggested the possibility of embodying standardization principles in car construction with special reference to the so-called "safety car." And aside from the application and use of the safety car it would seem that the principles laid down by the committee of the Electric Railway War Board could be applied in establishing a relation between the safety car and a larger type of prepayment car that would make possible the use of many parts in common. These could include axles, motors and truck parts. With safety cars two motors could be used and with the larger cars, four motors.

The committee advocated the use of the safety car wherever possible and stated that there are inquiries outstanding from electric railways within the State for 750 cars of this type, much of which business will be closed within a month.

The committee on membership, James F. Hamilton, chairman, reported three new members and four withdrawals, the latter including an enemy concern whose business was discontinued by our government. There are now thirty-four active, nine associate and eighty-eight allied members.

A SYMPOSIUM ON THE FARE SITUATION

Two main topics were set for discussion, the fare situation in New York and self-insurance. In the absence of the scheduled speaker on the first topic, Morris Cohn, Jr., Niagara Falls, N. Y., various phases of the fare situation were covered by Harlow C. Clark, editor *Aera*; Mr. Barnes; A. W. Loasby, president First Trust & Deposit Company, Syracuse, N. Y., and J. E. MacLean, attorney United Traction Company, Albany, N. Y.

Mr. Clark stated that fifty-five of New York's fifty-six cities have local electric railway service, but that in thirty-three cases franchise restrictions prevented an increase in fare without the consent of the municipal

authorities. Nevertheless sixteen fare increases have been made with city consent, and eighteen in cases where such consent was not required, or a total of thirty-four increases. The commissions have not refused increases where they had jurisdiction, but four cities have refused their consent. Seven applications for higher fares are still pending, and in nine cases no application has been made.

Among the thirty-four cities now having increased fares, there are six where a 7-cent fare is in effect; twenty-one, a 6-cent fare, and one a 6-cent fare on all but one line. Three companies now have zones outside of city limits; one has a suburban fare increase and two have secured the abolition of reduced-rate tickets.

Mr. Clark said that the authorities in New York lack a real understanding of the proper theory of rate control. The Carson-Martin bill to give the commissions control over franchise rates aroused opposition among high officials favoring city home-rule, but the service-at-cost plan recently proposed for Buffalo was vetoed by the Governor on the ground that it constituted an undesirable abridgement of state control over rates. The State of New York has either gone too far with commission regulation or not far enough, and the situation must be remedied. The first step to be taken is to make the people understand utility conditions, and to this end all investigations, such as those of the Chamber of Commerce of the United States, the Federal Electric Railways Commission and other bodies, will be helpful. In closing, Mr. Clark strongly urged that the car rider be informed as to what are proper charges against him in the cost of service, so that he will become the ally of the railway and thus insure public co-operation in the settlement of railway problems.

Mr. Barnes described the rate case of the Schenectady Railway, involving one city and three interurban divisions. In his opinion, the theory should be definitely established that the earnings and expenses of interurban cars within city limits should not be included in the accounts of the city lines but, because of the different type of operation, be carried into the interurban accounts.

In its case before the commission the Schenectady Railway urged that the three interurban lines be considered as one system, but the commission decided to consider them separately. It found the rate on the Albany division compensatory, but it increased the zone rates on the Troy and Saratoga divisions from 5 to 6 cents, at the same time permitting a 6-cent city fare in Schenectady. The interurban increases involved a novel point in that the charge for one zone was put at 7 cents with 6 cents a zone for rides of more than one zone so as not to burden the passenger who rides a short distance past a zone limit.

A glimpse at former days, when electric railway securities were regarded as safe investments because "people must ride," was given by Mr. Loasby, who said that his interest in the traction situation began twelve years ago with the organization of an investment department in his company. The investment situation today is different, he remarked, because it is almost impossible for an electric railway even to get bank support for current loans unless the bank is already involved.

Mr. Loasby declared, however, that he is an optimist. In his opinion the industry has passed through the worst of its troubles. Nevertheless he suggested that the

industry drop its policy of secrecy and fight through persistent publicity for just treatment. Less talk should be had about a specific 6-cent, 7-cent or any other fare, and more about an equitable agreement between each company and city. It would even be well to allow the public to be represented on company directorates. Mr. Loasby said that the bankers in New York are planning to aid the industry by enlisting the support of electric railway security holders.

Mr. MacLean, in connection with the Buffalo situation, explained that the Milburn agreement with its 5-cent fare restriction contained a clause stating that the contract between the city and the company was not effective until ratified by an act of the Legislature. In 1892 the agreement was submitted to the Legislature and ratified by a special act. It is now asserted by the International Railway that the stipulated 5-cent rate is not a franchise rate but a statutory rate and that the Public Service Commission for the Second District of New York can increase it.

The question whether the commission has jurisdiction and power, under the facts shown, to regulate fares in Buffalo is now before the Court of Appeals for final decision.

[The case is of more than local interest, for it involves the Quinby case in Rochester, whereby it was held that the Legislature had not clearly given to the commission any power it possessed over franchise rates, and the later South Glens Falls decision, in which it was held that under the regulatory law the commission has power to increase gas rates over those stipulated in grants of location. The inter-relationship of these cases was noted in the ELECTRIC RAILWAY JOURNAL of May 24, 1919, page 1027—EDITORS.]

At a hearing in the Buffalo case on June 6 before the Court of Appeals, the Schenectady Railway, the United Traction Company and the New York Railways intervened, said Mr. MacLean, in an endeavor to rectify what many considered was a mistaken decision in the Quinby case. A motion for the reargument of this case had been seriously considered, and it had been agreed that an application would be made, the New York Railways having prepared a comprehensive brief and motion papers. When the Buffalo case, however, reached the Court of Appeals, it was decided that the brief would be used in intervention. The brief is now before the court, and it is hoped that the Buffalo decision may constitute a reversal of the Quinby case without reargument. The International Railway attorneys have asked that the court, if it does not hold the Buffalo and Quinby cases to be different, reconsider the decision made in the Quinby case.

Mr. MacLean stated that he had no sympathy with the idea of going to municipalities for relief, because years of experience in coaxing, wheedling and forcing had shown that more than half-relief could not be secured from city authorities. He firmly believed that more power should be placed in the hands of the commissions in New York, and also that the law should be changed so as to enable them to clear up the matter of transfer charges.

COLLATERAL FOR SELF-INSURANCE

The paper on self-insurance in connection with workmen's compensation laws, by O. G. Brown, assistant secretary of the Self-Insurers' Association, is abstracted elsewhere. Supplementing his remarks, Mr. Brown said that under plans now under consideration by the State

Industrial Commission every self-insurer in New York State will probably be asked to readjust upward the securities deposited as collateral against compensation awards. The first proposal of the commission (which, for example, would raise the self-insurer's security deposit from an amount equal to a six months' premium in the state fund to a three-years' premium) would prove a great and unnecessary hardship to many companies and prevent them from becoming self-insurers and thus carrying insurance at actual cost. A compromise plan was recently presented to the commission whereby a self-insurer would furnish as a guarantee securities equaling a six-months' premium in the state fund and at every six-month or yearly period thereafter readjust the deposit according to the liabilities incurred, the deposit being increased when the liabilities amounted to one-half of it.

The committee on resolutions then presented the following, which was unanimously adopted:

The New York Electric Railway Association records with the deepest sorrow and regret the death of Horace Ellsworth Andrews.

Mr. Andrews was a pioneer in the electric railway industry. His contributions to its development were of the greatest permanent value, and largely to him central New York owes the conception and fulfillment of its largest traction system.

His qualities of integrity, courtesy and kindness endeared him to all with whom he was brought in contact, and especially to his fellow members in this organization.

Be it Resolved, that this memorial be adopted by the association, to be spread upon its minutes and that the secretary be instructed to transmit a copy thereof to Mr. Andrews' family.

Upon the report of the nominating committee, the following officers were elected for the ensuing year: President, E. A. Maher, Jr., vice-president and general manager Third Avenue Railway, New York; first vice-president, T. C. Cherry, vice-president Peck, Shannahan & Cherry, Inc., Syracuse; second vice-president, W. O. Wood, president New York & Queens County Railway, New York; and secretary-treasurer, W. F. Stanton, assistant to president New York State Railways, Rochester. The new executive committee consists of B. E. Tilton, general manager New York State Railway, Syracuse; W. G. Gove, superintendent of equipment Brooklyn Rapid Transit Company, New York; J. E. Hewes, general manager Albany Southern Railroad, Albany, and George Keegan, assistant to vice-president and general manager Interborough Rapid Transit Company, New York.

Mr. Maher, upon taking the chair, expressed the thanks of the association for the work accomplished by Mr. Weatherwax during the past year. Continuing, he said that he did not look for improved conditions in connection with labor and material prices. The impossibility of increasing production by the introduction of such improved methods and means as followed the Civil War, the large demands for goods in many lines and the unprecedented expansion of credit all point to the certainty that there should be no present hope of decreased costs.

In regard to labor, Mr. Maher said that he did not think wages ought to be reduced, and he hoped that they would never have to be. The cost of living has gone up, and the men are entitled to a living wage. Increased receipts, however, must come to the railways if this hope of continued wages is to be realized.

In Mr. Maher's opinion, two remedies for the present critical situation of electric railways should be sought

—(1) a decrease of expenses through the adoption of every practicable means for operating economy and the abolition of unnecessary mileage, and (2) an increase in receipts. The railways should get away from the idea of a fixed fare of any amount and endeavor by every honest means to bring to rate-fixing bodies a true realization of the condition of the industry and the necessity for an open and unprejudiced consideration of an equitable system of rate-making.

The Social Side of the Convention

THE day of the convention was an ideal one to be spent at a lake resort. It was warm but there was a pleasant breeze from the lake, and all of the outdoor sports which had been planned could be carried out. The chief events of the afternoon were a baseball game between the railway men and the supply men in the first part of the afternoon, and a golf tournament at the links of the Glens Falls Country Club. During these athletic events the ladies had an opportunity to participate in an auction bridge contest. Others among the delegates took trips on the lake or explored the historic points around Fort William Henry, of which there are many.

In the evening the annual banquet was held. President Weatherwax acted as toastmaster. The speakers were Brig-Gen. Frank T. Hines, chief of Transportation Service, War Department, Washington, D. C., Frank Buffington Vrooman, Ph.D. and Hon. Job Hedges, receiver New York Railways. General Hines gave an account of the methods employed by the government in collecting its army of 2,000,000 and shipping them to France, a work of great magnitude. Doctor Vrooman discussed the Bolshevik movement, the League of Nations and other topics. Mr. Hedges introduced his remarks with the statement that he had now learned that the duty of a receiver of a railway company was to stand at the end of a line and receive anything which all the others in the line let pass by. He then took up many topics of the day in an address which brought great applause.

Keep Mum

THE Northern Ohio Traction & Light Company supplies its motormen with cards similar to that reproduced. On one side is an injunction to silence, in four languages. On the other side is a cartoon, illus-

Self-Insurance for Workmen's Compensation*

Self-Insurance Is Valuable to Both Employer and Employee and Should Not Be Prevented by Requirement of Excessive Guarantees

By O. G. BROWNE

Assistant Secretary of Self-Insurers' Association, New York, N. Y.

WHEN compensation laws were established, the principle of negligence was abolished and compensation was predicated on the disability itself, and, for the most part, periodical payments. Inasmuch as these payments necessarily were spread over a long term of years, especially in the cases of serious injury or death, a new principle was brought into being—that of security for the payments. It has been argued that there was no guarantee given other creditors for the protection of their accounts and therefore there was no justification for exacting such a guarantee in the case of obligations to pay compensation to injured workmen and their dependents. This is answered by the statement that the very object of compensation laws is to prevent workmen from becoming wards of the state, and this purpose would in many cases be defeated if these payments were not secured.

This has been and still is the most troublesome question in the administration of compensation laws. It is mainly responsible for the absolute state monopoly existing now in five states, and it is the cause of the frequent attempts to create a monopolistic state fund in other states. While this menace to the right of employers has existed for some time, it has been accentuated by the spirit of unrest which has followed the war. It was one of the policies adopted by the American Federation of Labor a year or so ago and serious efforts were made to put the program through in a number of the states during the past winter. Whether or not workmen and their dependents will be any happier and have any greater security under a state monopoly is doubtful.

SELF-INSURANCE GENERALLY PERMITTED

Of the forty-one states and four territories having compensation laws, self-insurance in some form is permitted in all but eight. Of these as heretofore stated, five have a state monopoly, and some of those have elective laws so that one may carry ⁴his risk and not operate under the law if he chooses.

But New York State and all the states contiguous to it, except Massachusetts, permit self-insurance in one form or another. In Massachusetts one may operate under the schedule of the compensation act and fail to comply with its administrative requirements, which is the plan followed by a large number of employers. The question of security by self-insured employers is not a serious one in Pennsylvania, New Jersey, Connecticut or Vermont. Usually the authorities will accept the annual statement of a solvent employer and grant him the right to carry his own risk. The theory underlying this is that the employer's good will, prospective earnings and valuable plant are sufficient security to guarantee the payments he may be called on to make.

In New York, however, there is an entirely different problem. The law says the State Industrial Commission "may" exact the furnishing of securities as a guarantee. The commission has interpreted this to mean that

*Abstract of paper read before the New York Electric Railway Association, Lake George, June 7, 1919.

SAFETY—CO-OPERATION DO NOT TALK TO THE MOTORMAN — A SILENT REMINDER —		
<p>We want to carry YOU SAFELY to your destination. Whenever YOU speak to the motorman YOU temporarily distract his attention. Whenever he looks at YOU and listens to what you are saying, he concentration is thus diverted from the operation of his car. This means the danger of an accident. You and others and MICHIGAN cause an accident. We ask YOUR co-operation to avoid accidents. Do not TALK to the MOTORMAN.</p>	<p>Silati Silenti! Nel vogliamo portarvi a destinazione sicuro. Quando parlate al conduttore del carro, lo distraccate dal suo lavoro. Perché ogni qual volta egli vi parla, perde del tempo, e quindi l'operazione del carro. Questo significa il pericolo di un incidente. Voi e altri e MICHIGAN causate un incidente. Noi vi chiediamo la vostra collaborazione per evitare incidenti. Non parlate mai al conduttore se non all'operazione del carro.</p>	<p>POZOR! Mi želimo da vas bez opasno dovesti na namenu mjesto. Kad go prigovorite bi motormenu odvrata, jako pomutite od zbir namenu kucalo. Kad vas govora a ljudi na vas vreme pomutava se njihovo zbiranje na namenu mjesto. Ovo znači opasnost od nesreće. Vi i drugi i MICHIGAN stvaraju nesreću. Mi vas molimo da budete sigurni. Ne govorite nikad sa vozačem ako on govori sa vama. Ne govorite nikad sa vozačem ako on govori sa vama.</p>
THE N. O. T. & L. CO.		

THIS CARD SAYS "DON'T TALK," IN FOUR LANGUAGES

trating the evil effects of collision which occurred because a passenger talked with a motorman.

Copies of this card are being issued to railway members of the National Safety Council by H. B. Adams, chairman of the Electric Railway Section, together with other suggestions for safety.

it "must" exact them. And there is justice in this contention. The law is compulsory to the extent of its coverage. Payments must be made, even in the case of specific injuries, for years, and in death cases for the life of the widow. A widow twenty-one years of age has an expectancy of forty-one years. An extreme case, such as a widow thirty-six years of age with six children, aged twelve, ten, seven, four, and twins two years, respectively, where decedent earned \$100 a month or better, would mean that payments might aggregate the sum of \$18,000 and be spread over a long term of years, although commuted this would amount to but about \$11,000. As these liabilities grow they would in a few years amount to very large obligations, and on however sound a financial basis an industry may be now, no one can say what its condition might be five years hence. The commission is charged with the duty of exercising a wise discretion in exacting security for these payments, and it manifestly would not do its full duty if it did not require something tangible as a guarantee.

New York provides four distinct methods of providing security for these payments—liability insurance, mutual insurance, state-fund insurance and self-insurance. The laws respecting the first three forms of coverage are specific enough so that they are not a problem, and it is self-insurance which has recently concerned the commission. This concern has not been brought about by any failure on the part of self-insurers to meet their obligations. Even those concerns which are in receivers' hands have all met their obligations and have security provided for their outstanding liabilities. This is more than can be said for the liability insurance companies, of which one has not met its liabilities and another, I understand, raised considerable doubt. Rather has the concern felt by the commission been brought about by the unrest and some political philandering.

GUARANTEES TO BE READJUSTED UPWARD

For a long time the commission has used as a basis for determining the amount of securities it would require deposited as a guarantee, an amount equal to what would be required to purchase six months' insurance in the state fund. While as to small risks, this was not in the main unreasonable, it was as to large risks, for this premium, it must be borne in mind, is based on payroll expenditures in the risk considered but has a rather heavy loading for administration expense. It has been the contention of self-insurers that the amount of securities exacted should nearer approximate the actual hazard of the risk covered, by taking the experience as a basis, adding a reasonable amount for risk of catastrophe, increasing the amount as the liabilities grow, and receiving credit for the liabilities that terminate. It has been variously estimated that this would bring the peak in the amount of securities furnished in from eight to twenty years, although the best thought is that because of remarriages, deaths and continued payments, the average peak will be reached in ten years.

Moreover it has been urged that in determining the amount of securities, the commission should consider two very important things, one the value of the plant of the industry to be secured and the other the fact that under Section 34 of the law compensation payments are entitled to the same preference over other creditors, in the case of a bankrupt industry, as are unpaid wages. Where there is no great hazard in the

industry, such that the plant may be wiped out, which we know as the catastrophe hazard, there should be little apprehension that compensation would not be paid even if no securities were required. This latter proposition should and does appeal particularly to electric railways. It has been stated that it is impossible for such a company to kill more than three employees at one time. One of the largest electric railway organizations in New York recently surveyed its activities to get an idea of what, if any, catastrophe hazard it had and found that the largest number of men exposed to a single hazard was the operation of a work car containing eleven men.

This problem is still under discussion with the State Industrial Commission. It is disposed to be reasonable, but apparently it is determined that all self-insurers shall readjust upward the amount of securities they have to deposit. The chief concern of electric railways is to obtain recognition of the principles outlined above.

Electric Railways Hard Hit by War*

The Author Quotes Data to Show That This Industry Has Maintained Service Under Conditions Far from Equitable

BY HARRY B. WEATHERWAX

Vice-President United Traction Company, Albany, N. Y.

THE plight of the electric railway industry, hitherto a purely local question, has become a national problem of the gravest character. Of all the nation's industries, ours has emerged from the war in the least satisfactory condition. To-day electric railways representing more than one-tenth of the total mileage of the country are in the hands of receivers, with an additional mileage threatened with bankruptcy unless speedy relief is obtained. During the past year more than 750 miles of track have actually been abandoned. No other industry during the war period has sacrificed so much for the public service.

The whole situation is of such a nature that it is actually the personal concern of every man, woman and child in the country who rides on a street car. For many years the public has been educated more in the sins than the virtues of the greatest public service corporations. One has had only to cry "Watered Stock!" to defeat the most honest and businesslike attempts on the part of electric railway managers to relieve an ailing corporation of its burdens and improve its service. The problem of the public utility corporations to-day has nothing to do with watered stock or any other financial or managerial sin of the past. The task of the hour is an extremely simple one, lending itself to no prejudice or demagogism; it is primarily to secure enough revenue to enable us to meet our operating expenses. We can hardly even think in terms of a return upon the capital invested.

SOME HIGHLY CONVINCING DATA

The following concrete facts should convince anyone whose mind is open on the subject of the almost hopeless condition in which we find ourselves, and the situation is daily growing more alarming: During 1913, tax payments averaged about 5.8 cents on each dollar collected in street car fares, while during the year 1918, the companies returned to the public in taxes

*Abstract of presidential address delivered at Thirty-seventh Annual Meeting, New York Electric Railway Association, Lake George, June 7, 1918.

about 9 cents out of each dollar collected, an increase of about 55 per cent. In 1913, about 51 cents out of each dollar collected in trolley fares was paid out by the companies in wages to their employees, while during 1918 the companies so paid out about 70 cents out of each dollar, an increase of about 37 per cent. In 1913 there was expended in the settlement of accident and injury claims about 5 cents out of each dollar, and the companies have been successful in holding this fairly well to that figure in 1918.

We find, then, about 16 cents left out of each dollar collected in street car fares with which to buy materials and supplies for the operation of the properties for the public needs, and last year there was spent about 19 cents, or 3 cents more than was earned.

In the last report of the Public Service Commission, Second District, State of New York, some startling comments on the subject appeared, a few of which were as follows: During 1917 six roads were sold under foreclosure; the funded debt of the companies coming within the jurisdiction of that commission increased in 1917 about 59 per cent over 1910; there was an increase of about 19 per cent in 1917 over 1910 in the money outlay invested in construction and equipment; the corporate surplus decreased from \$3,334,310 in 1910 to a deficit in 1917 of \$6,717,517, a reduction of over \$10,000,000, or 301.4 per cent; maintenance of way expenses increased about 52 per cent; maintenance of equipment, 71.4 per cent; power expenses, 41 per cent. Then we come to the increase in the wages paid to conductors, motormen and other trainmen, which amounted to nearly \$2,500,000, or about 53 per cent, and this figure covers only the increase in 1917 over 1910. We all know what the War Labor Board did with this item in 1918.

Then the commission makes this significant comment on the situation as a whole:

A wave of business depression struck this country during the latter part of the year 1914 and extended far into the year 1915. The foregoing statements show a healthy and continuous increase in the operating revenue of these railroad companies with the exception of the year 1915, when there was a decrease compared with the preceding year. The revenue under this classification for the year 1917 was \$36,155,000. Notwithstanding the decrease in the year 1915, this was an increase over the year 1910 of \$11,238,000, or 45.1 per cent. As far as operating revenue alone is concerned, these figures show a prosperous condition which continued through 1918 up to October, after which it was unfavorably affected by the influenza epidemic. . . . While the financial condition of electric railroad corporations Dec. 31, 1917, was serious, it has become more so during the year 1918 by reason of conditions growing out of the war. The causes of a rapid and serious impairment of the net incomes of these companies were not to any great extent attributable to falling off in number of passengers carried except in the latter part of the year 1918, when it was adversely affected by the prevailing epidemic of influenza, but were due almost entirely to increased operating expenses. The above statements do not show all of the increases in operating expenses which during the year 1918 far exceeded those of any other year in the history of these companies. In addition to the advanced cost of materials, wages were substantially increased by order of the National War Labor Board. The conditions outlined above show that the public as well as the companies are facing a serious condition in the matter of electric railroad transportation. The well-being of the different communities is to a great extent dependent upon proper street-car service. The first step necessary to relief for all interested, which includes the public as well as the companies, is a thorough understanding of existing conditions on the

part of all concerned. It is a case where criticism, agitation, or legislation directed only to censure will not avail, nor will it relieve the situation. Whether the net income should be increased by a reduction in fixed charges, decreased operating expenses, increased rate of fare, charge for transfer, or limitations of service, can be determined only after full and careful examination of all the conditions affecting each individual corporation.

The above is a well-placed and directly pointed warning, coming as it does from one of the branches of our State government, and, unfortunately, it was but lightly received by the public.

"QUINBY CASE" DECISION A BIG SET-BACK

During the war the traction companies were ground between the millstones of the War Industries Board and the War Labor Board. It was the necessary duty of the former, for many reasons, to maintain stable prices, and as a consequence everything entering into street railway construction and operation went up at the rate of which you are all familiar. The War Labor Board increased the wages of street railway employees at the rate of \$125,000,000 a year. The companies in the meantime were chained down by franchises, municipal governments and local commissions, and were unable, as a class, to increase their fares to meet their expenses. The assistance afforded the companies by the government was meager. The terms of the law creating the War Finance Corporation were such that but a comparatively few railroads were able to avail themselves of its provisions, since ample security such as few of the companies possessed, was required as a condition of loans.

It was obvious that the recourse of electric railroads, so confronted with enormously increased expenses, was either an increase in the price of their service or a reduction in the amount of the service furnished for the prevailing price. This was the policy of every other industry affected by like conditions, as is evidenced by the increased price of practically everything that is sold on the market. It was, however, impossible for the electric railway companies to solve their problem in this simple manner in this State, due to the attitude of local and State politicians, who, since the decision in the Quinby case, have repeatedly failed in their duty to both the companies and the public. Some of the very communities to-day who are most bitterly opposing and assailing those properties, have been established and given their very existence by the accommodations afforded by those properties. The great Empire State is practically the last state to take action toward restoring the lost credit of its street railroads.

POLITICS IS A LARGE FACTOR IN RAILWAY TROUBLE

The national government, which assumed the right to increase the cost of operations, absolved itself of any responsibility as to the furnishing of revenue with which to meet the increase. The companies were themselves without power, which lay either with State regulating commissions or with the local authorities in the communities in which the companies operated. The commissions, where they have had full authority to deal with the situation, have tried to do their duty, but in cases where jurisdiction has rested with the city authorities alone the situation has been very discouraging. As a matter of fact, fare regulation by local authorities is usually a matter of politics. Street car service and street car fares form a favorite and convenient issue for

the politician, and this has been thoroughly illustrated in Schenectady, where a year ago this month the employees of the Schenectady Railway went out on strike for higher wages, demanding an increase of 10 cents per hour, a sum which the financial condition of the company would not permit it to grant. However, the matter was finally settled and one of the conditions of the settlement was that the case was to go to the National War Labor Board and at the same time the city officials agreed in writing that if the National War Labor Board increased the wages of the men, the Common Council of the city would change the conditions of the franchise containing a limitation in the fare to five cents, so as to permit the company to take the case to the Public Service Commission to have it adjudicated upon its merits, provided that a firm of accountants hired by the city, after looking into the company's financial condition, decided that it could not pay the wages based on the award at the then existing rates of fare. The National War Labor Board two months later made an award, increasing the rate of pay to the employees by 15 cents per hour. It was not until eleven months later, however, that the Common Council was prevailed upon to carry out its obligation, although the firm of public accountants hired by the city reported that an increase in the fare was necessary. The delay cost this comparatively small company more than \$200,000 in gross revenue. New York City is another shining example of how politics can ruin these properties.

Government or municipal ownership is being urged by many as a panacea, but it should be borne in mind that this will not remove the real problem, which is one of more revenue. Municipal ownership would only transfer the burden to other shoulders, not remove it. The whole situation could have been very much clarified if the scheme of regulation by commission in this State, which has been as we all supposed for the last decade fully in the commissions' hands, had been completed by the passage by the Legislature of a bill known as the Carson-Martin Bill, which was introduced early during the term of the last session of our Legislature. The passage of this bill would have taken the rate question out of the hands of local politicians and placed it where it belongs.

Good Advice to Men Who Must Constantly Be On Their Feet

ELECTRIC railway men, both on the platform and in the shop or power house, are almost constantly on their feet. A poster from the health service section of the National Safety Council on the subject of "Flat Feet" should be helpful to many of them. The poster states that so-called "rheumatism" in the ankles or the arch of the foot, or pains in any part of the leg below the knee may be due to this cause. Such symptoms should cause a man to consult his physician early.

As mitigative measures the following are recommended: (a) Walking with the feet parallel to each other and standing with the toes turned in, to throw the weight on the outer edge of the foot and relieve the tendency to flat-footedness; (b) wearing heavy-soled shoes with stiff insteps to protect relaxed arches, or adjustable leather arch supports for fallen arches; (c) bathing, sleeping and avoiding excessive fatigue, to impart tone to the muscles and strength to the tendons that support the arches.

Safety Car Discussed

Conclusions of Westinghouse Representatives, Car Builders and Operators Summarized Under Twelve Heads

THE annual meeting of Westinghouse electric railway representatives was held this year at the home of the Birney Safety Car, St. Louis, Mo. The purpose of these meetings is to discuss and exchange ideas in the matter of rendering greater assistance to the electric railway industry and the development and improvement of apparatus and service to the railway operators—their customers.

There were forty-one Westinghouse electric railway representatives at the meeting. The majority of these were from district offices in all parts of the country. The Safety Car Devices Company had ten representatives. With the car builders and railway operators who were present there was a total of approximately sixty attending the meetings.

The first two days, June 2 and 3, were devoted to "talks" and discussions on the safety car. On account of the limited time, evening meetings were also held. F. A. Richards, sales manager American Car Company, and his assistants described the detail design of their standard Birney Safety Car and outlined the plans of the J. G. Brill Company for expanding its already large facilities to meet the rapidly growing demand for Birney Safety Cars.

George Tontrup, president National Safety Car & Equipment Company, and his assistants explained what his company was doing; also their plans for the future safety cars.

E. B. Meissner, vice president St. Louis Car Company, gave a similar talk. All the car builders were pronounced in their optimism on the future of the safety car in electric railway service.

J. M. Bosenbury, superintendent of Equipment Illinois Traction System, gave a very instructive talk on the results secured up to date on the Illinois Traction System with safety cars. This company recently ordered a large number of additional cars from the American Car Company.

C. O. Birney, Stone & Webster, held the attention and interest of the meeting with a very clear survey of the street railway situation and demonstrated that the safety cars had solved the problems wherever they were operated and properly equipped as the designers have planned.

F. G. Buffe, Kansas City Railways, gave a most optimistic and inspiring talk on the railway operating situation in general. According to Mr. Buffe, the safety car is the solution of most operating problems. His company is planning for its general use.

W. S. Rugg, manager railway department Westinghouse Electric & Manufacturing Company, Mr. Cass, manager Safety Car Devices Company, Carl Beck of the same company and several others gave brief talks on the safety car and its application.

A summary of the points brought out by all of the speakers are as follows:

1. The Birney safety car, as built to-day, is suitable for some service in practically any town in the United States regardless of size. In many towns at least 75 per cent of the total service can be handled by the safety car.

2. The importance of employing the existing standard construction for universal application was impressed upon everybody. "Old man local conditions" was discussed pro

and con, it being the consensus of opinion of those present that in every locality where the situation had been carefully analyzed it has been possible to modify the conditions slightly without any great handicap so that the present standard car could be used.

3. Practically every installation of safety cars has resulted in increased revenue due, in most cases, to increase in the number of fares collected and decreased operating expenses.

4. If properly handled, it seems possible to combat every argument that has ever been raised by the commissions, the public, existing ordinances and the labor organizations. The reason for the advocates of the safety car being able to overcome any objections raised is due to the ultimate result of better service and increased income to the operating company.

5. Past installations of the safety car indicate that safety cars pay for themselves in three years.

6. In order to get the best possible operation of the safety car, it is logical so to modify the auditing system that the operator is not called upon to do any unnecessary clerical work.

7. The public traveling on the safety car unconsciously acts as a watchdog for the railway company. Numerous operating companies report that receipts materially increased since the one-man safety car has been adopted. In other words, the conductor-motorman gets all the fares and turns them in.

8. The changing over of old cars without adopting the accepted safety features should be discouraged, as it throws discredit on the up-to-date safety car, and often there has resulted in undeserved criticism of a system of transportation which has never been tried out.

9. Many operating men have felt that the present standard safety car is light and flimsy. General opinion, however, indicates that with a reasonable maintenance the car will most likely have a life in excess of its logical economical life, due to obsolescence in an ever developing art.

10. There seems to be a feeling that it is possible materially to decrease weight of the safety car. Possibly the car should carry less people, should be designed so as to use high-grade automobile materials, possibly be equipped with hollow axles, tapered fit wheels, etc.

11. Sixty passengers represent a full practical load for a safety car.

12. Mr. Bosenbury pointed out that electric railways indulge in a most expensive game when they attempt to use passenger cars to buck snow. They are not designed for it and will not do it. Regulation snow fighting equipment should be used.

Preventing Condenser Tube Corrosion

A REPORT of the corrosion committee of the Institute of Metals of Great Britain, presented on March 25, contains among a wealth of valuable data, analysis and recommendations the following conditions under which a 70:30 brass condenser tube should have a minimum life of twenty years:

1. Only clear water to enter the tube, or water which will not deposit suspended matter.
2. The water must be free from gases in suspension, and must not contain more than the normal amount of air in solution.
3. The water must be neutral or not more than very slightly alkaline. It must be free from ammonia and certain other specially harmful substances which are, however, of comparatively rare occurrence in waters used in power plants.
4. The temperature of the cooling water in the hottest part of the condenser should not exceed 35 deg C. (95 deg. Fahr.).
5. The speed of the water should be about 5 or 6 ft. per second.
6. The steam should be properly distributed in the condenser, according to the best modern design practice in this field.

AMERICAN ASSOCIATION NEWS

Executive Committee Will Appoint Committee of One Hundred

THERE was a good attendance at the meeting of the executive committee of the American Electric Railway Association in New York on June 10. President Pardee presided. Others present were T. S. Williams, P. J. Kealy, F. R. Phillips, R. E. McDougall, James H. McGraw, S. M. Curwen, Guy E. Tripp, W. Caryl Ely, John J. Stanley, B. E. Cobb, S. E. Wolff, J. G. Barry, P. H. Gadsden, E. K. Hall, E. B. Burritt, W. O. Wood, J. K. Choate, H. C. Clark and H. W. Blake.

The most important subject considered was the appointment by President Wilson of a federal commission to investigate the electric railway problem. The executive committee decided that the industry should be in a position to assist the commission in the supply of data or in any other way which might be requested, and that a committee of one hundred should be appointed to take charge of the matter. By unanimous vote of the other members of the executive committee Mr. Tripp was elected chairman of this committee and Mr. Kealy volunteered to give the next two weeks of his time to assisting in the details of the organization. It is hoped that the personnel of this committee can be announced next week.

The executive committee also voted in favor of recording its approval of the present daylight-saving act, and the following telegram was sent to Senator Calder of New York:

The executive committee of the American Electric Railway Association desires to record with you and your associates in the Senate its disapproval of any measure looking to the repeal of the present daylight-saving law.

Secretary Burritt also reported on the reservations for space at the October convention. The latest figures on this subject will be found elsewhere in this department under the report of the meeting of the exhibit committee.

Mail Hearing in Washington

THE first of the series of hearings to be conducted by the Interstate Commerce Commission to determine the rates which are to be paid by the United States Government for the transportation of mail on the electric railway lines of the country was held in Washington, D. C., on June 9. Seventeen other hearings will be held in different cities before July 28 at which time it is hoped all the testimony required will be gathered. The full schedule of these hearings was published on page 926 of the issue of this paper for May 10.

Those in attendance at Washington representing the government included: Examiner Brown, and M. O. Lorenz, chief statistician, Interstate Commerce Commission; J. Stewart, assistant to the attorney general, and J. B. Corriden, Superintendent Division Railway Adjustment, Post Office Department. The electric railway representatives included: S. S. Ashbaugh, the attorney who will represent the American Electric Railway Association at all the hearings; J. H. Hanna, Capital Traction Company; L. H. Palmer, and R. L.

Chamberlaine, United Railways & Electric Company of Baltimore; W. L. Clark, Washington Railway & Electric Company; J. H. Alexander, Cleveland Railway; F. W. Coen, Lake Shore Electric Railway; W. D. Witt, Philadelphia Rapid Transit Company, and James W. Welsh, American Electric Railway Association.

Commissioner Brown presided, and the examination of the railway witnesses was conducted for the Post Office Department by Mr. Stewart, who it is expected, will act in this capacity at all of the hearings in the series.

The first witness for the railways was Mr. Welsh who presented a number of exhibits including a circular describing the method of computing cost of mail service recommended by the association and issued by it. Mr. Hanna, who was chairman for the Washington meeting of the railways there, then presented the exhibit for his companies and explained various operating conditions which existed when the Washington companies were carrying the mail, a practice now practically discontinued. Mr. Palmer then presented a detailed statement for his company of the cost of conducting an independent car service. The Charleston Consolidated Railway & Lighting Company, the Charleston Isle-of-Palms Traction Company and the Hagerstown & Frederick Railway Company, also presented briefs. In general the testimony of the railway officials was that the compensation for carrying mail should be at least three times what it is at present. This was borne out by the exhibits presented.

At the close of the hearing Commissioner Brown requested, hereafter, that five copies of all exhibits be presented as follows: Two for the Commission, two for the Post Office Department and one for the railway attorney.

Applications for 10,000 Square Feet

A MEETING of the exhibit committee of the American Electric Railway Association was held in New York on June 12. Those in attendance were C. R. Elliott, chairman; Fred C. J. Dell, F. H. Gale, J. C. McQuiston, A. M. Robinson and E. D. Smith.

The committee decided to appoint two sub-committees. One on decorations and space assignments will be composed of Messrs. Dell, McQuiston, Gale and Senator. The other on publicity in connection with the Convention daily consists of Messrs. Gale, Dempsey and Robinson. It was also decided to employ a director of exhibits.

Secretary Burritt announced that although the application blank for exhibit space did not go out until June 1, already about 10,000 sq. ft. of space had been applied for. After a discussion of the finances, the committee adjourned.

Valuation Principles Analyzed

THE valuation committee of the American Association met in New York on June 11 to continue its discussion of basic principles. The members in attendance were P. J. Kealy, Kansas City, Mo., chairman; W. H. Sawyer, Columbus, Ohio; Martin Schreiber, Newark, N. J.; George Weston, Philadelphia, Pa., and E. E. Tilton, Syracuse, N. Y. E. B. Burritt was also present.

As arranged at the preceding meeting of the committee, Mr. Weston had formulated a statement of cardinal valuation principles and the various elements

to be included in an appraisal. The discussion centered around this statement, each section being carefully examined as to its phraseology, intent and probable effect.

The executive committee of the Claims Association met in New York on June 11 for the purpose of discussing the work of the association and outlining the program for the coming convention. Those in attendance were R. E. McDougall, Rochester, N. Y., chairman; S. B. Hare, Altoona, Pa.; H. D. Briggs, Newark, N. J., and George Carson, New York, N. Y.

LETTERS TO THE EDITORS

Increasing the Earning Capacity of Electric Railway Lines

NEW YORK CITY, June 4, 1919.

To the Editors:

In the issue of the *ELECTRIC RAILWAY JOURNAL* for May 31, there are two very interesting articles concerning the economies in electric railway operation which must be striven for in order to meet the entirely new conditions which have been brought about by the period of readjustment. I refer to the editorial entitled "There Is a Better Outlook in Railway Power," and the abstract of the paper by Alexander Jackson printed under the heading "Plain Words on Transportation Service." These articles give a comprehensive summary of the details of operation in which great improvement is possible in the direction of scientific management.

As a long-time advocate of higher efficiency and scientific investigations in the operation of electric railway cars, I would suggest that there is another great field that more than ever assumes practical importance in these days of enforced thrift, namely, the careful analysis of the power requirements of the car under different service conditions and modes of operation.

There are people in the electric railway field who can never abandon rule-of-thumb methods of operation, and they must be left to their fate. There are, however, many up-to-date operators who have kept close watch of the car operation end of the business, where most of the company's expenses are incurred, and they realize that there is a close relation of efficiency in car operation and net earnings. In the mind of a man of this type such questions as the following are arising during these days:

Is the kind of service formerly found to be efficient necessarily to be revised to meet the unexpected and sweeping changes that have recently taken place? Are the schedule speeds formerly used the most economical in view of the very heavy increases in platform expense?

In order to meet increased traffic demands, is it better to raise schedule speed or to provide increased seating capacity at lower speeds with the aid of trailers?

Is it wise to run with an abnormally high percentage of coasting when it is possible by speeding up schedules to get in some extra runs without increase of wages?

These questions merely hint at the many-sided character of the problem of efficient operation. Never was careful investigation more fully justified by conditions than it is at the present time.

Another matter in the same general field is that of adapting cars to satisfactory methods of fare collection. We have the prevalent heavy, doubly-manned single-fare car that has suddenly become a money-eater; also the

safety car that cannot take care of the ordinary heavy traffic, and finally the highly complicated car for the automatic collection of zone fares. There ought to be some kind of an intermediate solution of this problem in which the several requirements can be met, the car being provided with devices to insure safe service and permit a semi-automatic system of fare collection.

F. CASTIGLIONI.

Way Engineer Wants Car Weights Reduced

BROOKLYN RAPID TRANSIT COMPANY

BROOKLYN, N. Y., June 10, 1919.

To the Editors:

Anent your editorial in the issue for June 7 on "City Track Not an Energy Saver," I note that in comparing automobiles with street cars you say that it is the cost of rubber tires rather than energy economy which dictates the use of track. This is probably true as it affects the comparison between street cars on rails and automobiles out on the pavement, but there are some other factors which have even more weight in rendering desirable the use of tracks made of rails.

Historically, transportation by rails had its beginning in the need for some means of hauling heavy loads over bad roads by other means than the easily mired wagon wheels. We still have the heavy loads, even though we have better roads, and the most modern pavement as ordinarily put down will not long withstand the destructive effect of carrying 30 to 40 tons steadily and continuously in one path as the rails are still required to do in many of our city railway systems.

The track man has been forced to build track for the heaviest loads which the car builders for a long time seemed to think had no limit. This has been true in both steam and electric railway service. While you are pleading for the rails please make a plea for the continuation of the efforts now being made to relieve the track of its unjust burdens by lessening the car weights. The ultimate savings in operating costs of all kinds to be gained by so doing are obvious.

R. C. CRAM,
Assistant Engineer,

Department of Way and Structure.

The Seatless Car Idea Will Not Down

NEW YORK CITY, June 9, 1919.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for June 7 a news item was published to the effect that Tokyo has been added to the list of foreign cities where the seatless car is being tried out. In August of last year it was noted in your columns that the scheme was under test in Rome. As one of the contributors to the paper puts it, under rush-hour conditions the public must generally ride standing and has become inured to doing so. Since the first duty of the car seems to be that of carrying passengers, the matter of how much comfort is provided is to a certain extent secondary. If more people can be carried standing, without indecent overcrowding, it certainly is the part of wisdom for transportation engineers to give the seatless car scheme more serious consideration. Such cars should load and unload faster, and consequently get over the road more quickly. This is a desideratum in rush-hour service.

The gain in service thus provided is augmented by the ability to carry more passengers in a given time with the same amount of equipment. The cars also would

be doing more effective work in carrying passenger weight instead of dead seat weight.

In earlier editorial comment the JOURNAL stated that it did not wish to be understood as recommending the plan except in an emergency and where the run was short. While the paper has presumably not changed its position in this regard, would it not be well to suggest that some enterprising company in this country should try the scheme out? In order to put it over right it would obviously be necessary to advertise the plan properly before doing so, and to point out the advantages carefully, not forgetting "to beat the objector to it" by showing that most of his objections have been foreseen and that the trial is being made solely to get at the true situation in regard to the question of how far the people are willing to stand provided they can get a chance to do even that. I am inclined to the view that a well-planned advertising job would have every chance of making a success of a scheme which operators now hesitate to give a serious trial. "OBSERVER."

Maps Carried on French Subway Cars Also

60 WALL STREET

NEW YORK CITY, June 10, 1919.

To the Editors:

The article in your last issue on "Why London Subway Riders Do Not Go Astray" shows that the rapid transit management is alive to the importance of merchandising transportation, but the fact is equally true of the Paris subway managers. In Paris the cars carry an outline map of the route, very similar to that described in connection with the London underground roads. Each station is indicated by a black circle, and the stations connecting with other lines are indicated by a double black circle with an intersecting line. At a connecting point a short description is given of where the other line goes.

The whole map takes up a space of 4 in. x 18 in. and is usually mounted on the door in an up and down position. In some cases, however, it is mounted by the side of the door, and on one line it is placed on the ceiling of the car in the form of a "V" and can be seen from any point in the car. All that a person has to do to determine his location is to note the name of the station at which the train is stopped, and then by looking at the map his position is at once apparent. It is thus possible for a total stranger to get around the city with very little trouble.

This system of maps in the car would be a distinct advantage in American practice and would be applicable to subways, elevated trains, suburban electric and steam trains and to surface cars. For use on the surface cars only the principal streets and transfer points would need to be indicated.

K. B. HUMPHREY.

The London Underground Railways and London General Omnibus Company are having good success with their group operating department efficiency meetings. The purpose of these is to give the members of the administrative and control staffs some knowledge of the equipment and its operation. Recent programs included an illustrated lecture on bus maintenance and a number of papers presented by members of different grades of the control staff on "Problems in My Official Life."

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Settlement Plan for Denver

Manager Hild Staggered by Proposal of Citizens' Committee—Mayor Threatens Reprisals

The adjustment committee of fifty-five citizens appointed in January by the Mayor of Denver, Col., has recommended a special election to adopt the service-at-cost plan for the Denver Tramway under a board of control, two members to be appointed by city and one by the tramway, to take over the management of the system. The committee has also recommended the abolition of the \$60,000 yearly franchise payments, paving between rails and free riding by city employees. If the plan works the city may purchase the system upon the basis of the Public Utilities Commission valuation of \$23,674,100.

The company now operates with a 6-cent fare. The new Mayor, Dewey C. Bailey, who took office on June 1, had advocated the restoration of the 5-cent fare. F. W. Hild, general manager, states that a 5-cent fare now would mean a receivership for the company. In this connection Mr. Hild is quoted as follows:

The 5-cent fare would make it impossible to meet these charges, so that receivership must inevitably follow and you, as a business man, well know that a receiver, who is an officer of the court, must, under the law, seek to protect the investment in the property.

Regarding the proposal of the committee of fifty-five for a board of control of three members to take over the management of the tramway on a service-at-cost plan, Mr. Hild said in part:

I can only reiterate that the proposal is so revolutionary that we have not yet recovered from the first shock. It is such a radical departure from any plan ever proposed before that we have not been able to formulate an opinion.

Two things stand out very clearly, however. The valuation is obviously too low. We thought we had introduced evidence enough to convince anybody that the investment in the tramway far exceeds the valuation accepted by the committee of fifty-five.

Furthermore, the limit of return set in the report is too low to attract capital to the traction business. We cannot hope to compete for capital with other legitimate businesses with a limit of 7 per cent on our returns.

It is not expected that the directors of the company will consider the plan formally until their meeting on June 23.

Wants Philadelphia Plan Changed

William S. Twining, transit director of Philadelphia, Pa., has come out openly against the plan of rapid transit for Philadelphia formulated by A. Merritt Taylor, who formerly was director. Using the changed conditions brought about by the war and holding

up the menace of a higher fare resulting from an increased construction cost of \$6,000,000, Mr. Twining concludes that the transit plans must be changed. He says:

It is now generally recognized by the public that the conditions under which the city entered the transit field in 1915 no longer obtain. While possibly the plans as then adopted might have been considered perfect, it is now evident, that, as a result of the unexpected developments of the last three years, the city's transit plans must be modified if the city expects to escape with a reasonable fare under the contract which has been signed with the Philadelphia Rapid Transit Company. The city's system as now authorized will probably cost upward of \$60,000,000 more than was originally contemplated when the fare was expected to be 5 cents and the resulting increase of interest and operating cost of the system must appear in the fare.

To get away from the Taylor plan, Mr. Twining recommends a referendum by which the people may reconsider their former decision.

Mr. Lillenthal Died Helping Others

Jesse W. Lillenthal, president of the United Railroads, San Francisco, Cal., whose death was announced in the ELECTRIC RAILWAY JOURNAL for June 7, succumbed suddenly as he reached the climax of a speech at a luncheon at the Hotel St. Francis in that city on June 3, inaugurating the loan drive for St. Ignacius College.

To those who were in attendance, Mr. Lillenthal seemed in good health. The tenor of his address was a high-minded appeal to the city to make the drive a success. He said that Protestant, Catholic and Jew had been working hand in hand across the seas, and that he could think of no organization that was better prepared to oppose the forces of the agitators and malcontents than the Roman Catholic Church. In this connection he said:

In times like these we know no creeds. For the American of to-day there should be only one thought—one country, one flag and one God.

As he uttered these words, Mr. Lillenthal staggered, reached out a hand for a chair in which he had been sitting before being called to speak, and then collapsed. His wife and son were immediately notified.

William von Phul, general manager of the United Railroads, paid the following tribute to Mr. Lillenthal:

In the death of Mr. Lillenthal San Francisco has lost one of her foremost citizens, and the United Railroads a president whose influence was always for the good of the community, a man in whom everyone had implicit confidence. Every employee of the company feels his death as that of a personal friend. During the three years in which I have been closely associated with Mr. Lillenthal, there is no one whom I have admired more, and of whom I have greater knowledge of his high ideals and thoughts for others. He has practically sacrificed his life in service to the community.

Suit Follows Strike

Pittsburgh Attorney Seeks to Establish Point that Public Service Employees May Not Strike

In one of the most unusual actions ever brought in a Pennsylvania court, a Pittsburgh attorney has sued the Amalgamated Association of Street & Electric Railway Employees for \$2,038,000.78, which sum he estimates as the amount of the damages that were inflicted by the employees of the Pittsburgh Railways in their recent four-day strike.

The complainant is A. E. Anderson, of the Allegheny County bar. In his petition for a hearing in equity in the matter he submits a tabulated bill of damages resultant from the strike. His own share of this bill is the 78 cents, the difference between his railroad fare during the strike, and car fare. The other \$2,038,000 is what he figures as the loss sustained by the riding public in paying for transportation during the strike at rates higher than carfare, by the receivership of the company in loss of revenue, and by the strikers themselves in loss of wages. Attorney Anderson has entered his suit in behalf of all of them.

SUIT IS TEST CASE

The suit is meant, of course, not as an effort to recover damages, but as a test case. The complainant raises the point that public service employees may not lawfully strike and he wants a court to hear his arguments and rule on the question.

Mr. Anderson contends that courts have held that the right of persons to quit work and induce others to do so is "necessarily subject to limitation when employment is accepted in a business charged with public interest." His huge bill of damages is made part of his suit to show the extent to which the public interest was involved in the strike.

After setting forth the circumstances of the strike Attorney Anderson concludes with a petition to the court that it decree that the actions, rules and regulations of the defendant association, its officers and members are illegal, null and void and that the association, its officers and members have become liable to "your orator and other citizens for the loss and damages above set forth."

The strike of the employees of the Pittsburgh Railways was declared on May 14 and came to an end on May 18. The issues involved were reviewed in the ELECTRIC RAILWAY JOURNAL for May 17, page 977, and May 24, page 1020.

Detroit Men Strike

While Council and Railway Talk and Juggle Figures Men Tie Up Entire City System

Service on the lines of the Detroit (Mich.) United Railway ended 4 a. m., on June 8, the motormen and conductors having voted in favor of a strike at their meeting on June 7. On the recommendation of their officers, the strikers agreed to continue to carry milk and perishable freight into the city, but to turn back interurban cars at the city limits. The interurban employees will not be called upon to join the strikers unless it is evident that the increased wages will not be granted within the next few days.

COMPROMISE OFFER FAILS

Up to June 6 hope was expressed by all parties concerned that a strike would be averted. Mayor Couzens called a special session of the Council that day. Although one of the Councilmen voiced his opinion that the situation, serious as it was, was not a matter to be decided by the Council, but rather by the men and the company, a majority vote was obtained favoring a compromise offer as follows:

Stright 5-cent fares on all lines, with universal free transfer, abrogating the Pingree 3-cent franchise and workmen's eight-for-a-quarter tickets.

F. W. Brooks, president of the company, stated that it had been agreed to grant the men a compromise increase of 10 cents an hour, subject to confirmation by the union. In order to meet this increase he contended that the company would have to demand a 5-cent fare on all lines with 1 cent for each transfer issued.

It was brought out in the discussion that the city's audit of the company's revenues and expenses varied from the company's audit by about \$139,000 for the three months ended March 31, the city showing a gain instead of loss. The main difference resulted from an item of \$100,000 which Comptroller Engel deducted from the depreciation charges claimed by the company.

President Brooks stated that the company could not surrender any franchises except those of the Pingree and Milwaukee Avenue lines, because they were the only ones granted by the city. Other sub-end franchises were granted by townships (since absorbed by the city) and are affected by mortgages which have to do with other property, he set forth.

FARE CHANGES SUGGESTED

In the final discussions it was contended by the city officials that the abrogations of the Pingree franchises would be a concession to the company since the company is losing money on the 3-cent lines. The elimination of workmen's tickets and raising of fares on all lines to 5 cents would increase the company's revenue \$1,190,000, sufficient to pay the 10-cent wage increase. This new rate of fare was to be tried for three months and at the end of that time a readjustment would

be made if found necessary. These suggestions were turned down by Mr. Brooks.

To the demand of the men President Brooks replied that he was obliged to notify them that the company could not undertake to carry out their proposition until the City Council granted the necessary relief. The offer of the city he stated was entirely inadequate to care for the situation.

Mayor Couzens in his statement of June 7 said in part:

On June 3 figures were presented to the Common Council, together with estimates of what certain increases in fare based on estimated passenger traffic, would mean to the company.

Basing the passenger traffic income on the experience of the three months under review, it was estimated that the company would carry 305,000,000 passengers in 1919, which at the present rate of fares, would bring in an income from passenger traffic of \$14,000,500, and that the railway had an income from other sources aggregating \$215,000, making the total estimated income for 1919 \$14,275,500; and that if the Common Council would grant the company a straight 5-cent fare, which the Council has now promised to grant, the gross income would be \$15,465,000, or an increase of \$1,189,500 for the year.

In view of the fact that all the records show that the company was not actually losing money at the present rate, it seemed that what the city should do would be to grant the company a sufficient increase to permit it to pay the increase to the men, which the honorable Common Council, by resolution, agreed to.

At eight o'clock on the night of June 9 Circuit Judge Adolph Marschner issued an injunction restraining the railway from suspending service on the 3-cent lines. Under section E of the appeal for the injunction, which is signed by Mayor James Couzens and Corporation Counsel Wilcox, the court is asked to appoint a receiver for the company if it fails to operate cars.

COMPANY WITHIN ITS RIGHTS

The city leaves the wage settlement entirely up to the railway and its conductors and motormen. It is pointed out that the company is solvent, has upwards of 800 miles of railway in the city and State and has a large surplus, and is able to pay the advance required by its employees.

The city's action is based principally on sections of the old Detroit Railway franchise granted on Dec. 4, 1894. In Section 11 the franchise is designated as a "contract," while Section 18 provides for court proceedings to settle any dispute.

Councilman John C. Nagel filed notice of a reconsideration at Tuesday's Council meeting of the resolution passed last week allowing the railway a straight 5-cent fare. This action was taken prior to the city's court action to force the railway to resume service on the 3-cent lines, and will limit the amount of fare collected on these lines to the former rate of eight tickets for 25 cents during the day and six for 25 cents at night.

President Brooks mailed a statement to the Common Council, offering to arbitrate the differences between the city

and the railway and declaring that the legal position of his company was unassailable. He suggested the Public Utility Commission as arbitrator.

The legal attack on the railway followed a series of conferences on June 9 between Attorney General Alex. J. Groesbeck, Corporation Counsel Wilcox and Attorney Otto F. Kirchner.

Service of the writ of injunction on Harry V. Catlin, cashier of the railway, at noon on June 10, ordering the company to operate cars at once on the 3-cent lines, made the injunction effective immediately, according to opinion of Judge Marschner, who issued the writ. After a reasonable time has been allowed Mr. Catlin to get in touch with his superiors, whom the officers were unable to find, the company's officials will be adjudged in contempt of court.

The city officials of Detroit and the officers of the Detroit United Railway reached a compromise agreement on June 13 providing for a straight 5-cent fare. There will be a board of three members to decide after trial whether a charge for transfers is necessary. The settlement agreement made the court order binding on both parties. One member of the arbitration board is to be chosen by the city, one by the company and the third by the first two. If the board is unable to decide the fare charge the case will go to the Circuit Court as a rate case. The employees are still protesting a 9 to 12 per cent increase. They ask an increase of 17 per cent.

Windsor Wage Audit Arranged

The special street railway committee of the Council of Windsor, Ont., first recommended that the Council repeal or withdraw the by-law to grant the Sandwich, Windsor & Amherstburg Railway increased fares. As this was not in accord with the opinion of all members of the Council, amendments and amendments to amendments were submitted and in turn voted down.

The Councilmen finally decided that the railway board could best settle the question relative to the demands of the men, after City Solicitor Frank Davis had introduced a resolution, asking the railway board to step in and investigate the company's accounts by an audit of its books. It was accordingly decided to ask the Ontario Railway Board to determine if higher fares are necessary to meet the wage demands.

Some members of the City Council upheld the by-law and fought for its amendment, leaving out Sandwich, where the company can charge a 5-cent fare without the referendum.

The transportation committee set forth that the Ontario Railway Board is in position to say what wages the company shall pay the men and what rate of fare will be charged, and also have absolute power in investigating the books of the company. It was also stated that municipal intervention was logical only if city cars were tied up.

Paving Controversy in Pittsburgh

City officials of Pittsburgh, Pa., resorted to vigorous action in their controversy with the receivers of the Pittsburgh Railways over the street paving during the week ended June 7, when a gang of city workmen was sent out to remove the tracks from a section of Warrington Avenue. Within six hours an injunction to restrain the city had been granted and dissolved. The tracks were then removed.

The basis of the dispute between the city and the receivers is an ordinance of long standing requiring the company to repave between its tracks wherever the city improves a street. Ever since the financial difficulties of the railway reached a crisis with the appointment of receivers the city has complained of failure on the part of the company to obey this ordinance.

Extensive improvements are under way in Warrington Avenue and the expense to the company of its share would be about \$100,000. It has been one of the contentions of the receivers, during disputes with its employees over wage matters and with the public over proposals for higher fares, that the present income and expenses of the company do not allow money even for such essential expenditures as this.

The section of track the city has torn up is not in use. Cars are running on other portions of the street for which improvements are contemplated, but an agreement on division of expenses is expected to be reached before there is occasion for the city to tear up any more track. The proceedings were the first open clash between the city administration and the present receivership.

Talk of Separate Commission for Washington

The House of Representatives district committee may report a bill to create a public utilities commission separate from the District Commission. This belief is based largely upon a discussion that took place among members of the appropriations committee when the payment by the utilities commission of money for expert service was under consideration. It was contended by Representative Gard that a separate commission that could give all its time to consideration of utilities matters in the District of Columbia would not have to spend money for expert services. The suggestion was made that the matter could be looked into profitably by the District committee.

If a measure creating a separate commission is framed and sent to the commissioners for an expression of their opinion it will meet with the disapproval of at least two members of the board of commissioners, according to present indications.

The commissioners of the District of Columbia are ex officio members of the Public Utility Commission of the District of Columbia. Two of them are not engineers and they have very little

knowledge of transportation, finance or other matters coming up in the operation of public utilities. Worst of all, their duties as commissioners of the District of Columbia in handling matters of police, opening of streets, fire insurance regulations, building ordinances, etc., are so varied and taxing with respect to calls upon their time, they have very little time left to devote to their duties as public utility commissioners.

Buses Planned for Detroit

The Detroit Motor Bus Company has been organized under the laws of Michigan with an authorized capital stock of \$1,500,000 to "give new and better transportation and make Detroit a better place to live in." The company is headed by Richard W. Meade, formerly president and general manager of the Fifth Avenue Coach Company, New York City, operating the buses on Fifth Avenue in that city.

The Detroit Motor Bus Company proposes to operate under the general ordinance approved by the City Council of Detroit on Dec. 26, 1917, as amended on March 26, 1918, licensing the operation of motor buses on specified streets. It is proposed to provide for initial service 100 motor buses of forty-seven-passenger double-deck type, similar to those in New York but lower in height. Three principal routes have been selected for initial operation as supplying relief where most needed and most readily given—one on each of the nearest available streets on either side of Woodward Avenue, running to the Ford plant and the city limits respectively, and the third on Jefferson Avenue, running to the city limits or some intermediate point. All of the routes will have terminals at the Campus Martius and will reach the principal points of attraction in the central district of the city.

In a circular describing the proposal, the gross annual operating revenue when the lines are in full operation is estimated at \$1,235,160, with operating expenses, taxes and deductions of every character at \$946,080, leaving a net income of \$289,080. The stock of the company has a par value of \$10 per share and is being offered for popular subscription in Detroit.

No Changes in Illinois Commission

The efforts have failed which were made at the recent session of the Legislature of Illinois to curtail the functions of the Public Service Commission or to put that body out of business. The "home rule" element, mostly mayors of smaller cities, was particularly active in the fight. A test vote of eighty-four to fifty-four on June 5 saved the commission.

Only one more bill regarding regulation is pending. This proposes to increase the membership of the commission from five to seven, thereby providing a continuous reviewing court for Chicago and upstate cases. This is

said to be favored by a majority of the lawmakers because it will enable the commission to act more promptly on the many appeals which are now pending.

Chicago's traction bills are said to be dead. These included four proposals for enabling legislation which will be needed before effective changes can be made in the existing franchises. The bills were presented late in the session. While they appeared to have the endorsement of all interests, there was little hope for them from the start because the Legislature will adjourn in a few weeks. The bills were referred to in the ELECTRIC RAILWAY JOURNAL for May 17.

Warns of Labor Unrest

Addressing the annual convention of the National Conference of Social Workers at Atlantic City, N. J., on June 2, Basil Manly, joint chairman of the National War Labor Board, warned that a period of unrest and strikes, which would overshadow all previous disturbances, was about due in the United States. He is quoted as follows:

We are about to enter a period of the most acute industrial unrest and the most bitter industrial controversy that the American nation has ever known. Unless effective and radical steps are taken to bring about a better understanding between labor and capital and to establish an equitable basis for orderly industrial progress, we are certain to see within the next year strikes and mass movements of labor beside which all previous American strikes will pale into insignificance. Since the signing of the armistice we have had a large number of small strikes and a few great spectacular strikes. But these have been so limited in comparison with the labor upheavals in other countries that there has been a public disposition to regard the industrial situation with complacency and to assume that, having passed through the first part of the period of transition without serious industrial disturbance, we were about to enter an era of industrial peace.

American Ideals Taught

Classes in citizenship organized last November by the Minneapolis (Minn.) Street Railway received diplomas on the night of June 3 at graduating exercises in the carhouse at Washington and Twenty-fourth Avenues, N., to which 500 members of the families of the 125 conductors and motormen were carried by special cars. The diplomas were signed by the Secretary of Labor of the United States and officials of the Minneapolis public schools. A similar graduation will be conducted soon in St. Paul.

Horace Lowry, president of the Twin City Rapid Transit Company; Prof. A. E. Jenks, of the University of Minnesota; Mayor J. E. Meyers; W. D. Dyer, W. A. Anderson and Supervisor of Americanization W. R. Ball spoke. The audience recited together:

I pledge allegiance to my flag and the republic for which it stands; one nation, indivisible, with liberty and justice for all.

The classes have been conducted in four carhouses once or twice a week. Similar classes will be instituted next fall.

St. Paul Inquires Into Traction Affairs

The St. Paul Association has made public an analysis of the survey of electric railway conditions in the United States conducted for the association by C. Whit Pfeiffer, secretary of public affairs of that body. No recommendations are made in regard to terms for a settlement of transit problems with the Twin City Rapid Transit Company, but it is pointed out that the service-at-cost plan appears to be more satisfactory than the old time franchise.

The association will not go on record favoring any plan of solution of the local railway problem, until a thorough study of the entire situation has been made. Preliminary consideration of Mr. Pfeiffer's report will be begun at once. Special sessions of the City Council also will be held to consider the proposed franchise and citizens are asked to attend these meetings that they may hear the discussions and keep intimately informed of the progress of the negotiations.

News Notes

Boston Strike Averted.—Union employees of the Boston (Mass.) Elevated Railway have voted by a large majority to refer to the War Labor Board the wage and hour demands recently served upon the company.

Cambridge Subway Purchase Bill Reported.—A bill favoring the purchase of the Cambridge subway from the Boston Elevated Railway at a price of \$8,000,000 by the State of Massachusetts has been advanced to a third reading in the House of Representatives.

Negotiating for Windsor Road.—Negotiations are reported to be under way by the Hydro-Electric Power Commission of Canada for the purchase of the 28 miles of electric railway owned by the Detroit (Mich.) United Railway in the Windsor-Sarnia-Ford City district. The properties are included in the system of the Sandwich, Windsor & Amherstburg Railway.

Muskogee Strike Settled.—The strike on the lines of the Muskogee (Okla.) Electric Traction Company has been settled. An increase of 30 per cent has been made in the wages of the men, all of whom have been reinstated to their former places with seniority rights. The strike was in progress more than a week. During that time no cars were operated.

Toronto Mayor Planning Ahead.—Mayor Church of Toronto, Ont., at a recent meeting moved that a recommendation be made to the City Council favoring the submission of a by-law to the people at the next municipal elec-

tion providing for the expenditure of \$5,000,000 on track extension, rolling stock and other equipment, preparatory to the taking over of the Toronto Railway in 1921.

Wage Increase on Evansville Interurban.—Following a conference on June 4 between officials and trainmen of the Evansville-Princeton line of the Public Utilities Company, Evansville, Ind., the company granted the motormen and conductors an increase in wages amounting to 5 cents an hour. The men on the interurban line have been receiving from 34 to 38 cents an hour on a sliding scale. Under the new agreement the men will work nine hours where they have been working ten and ten and one-half hours. It is reported that motormen and conductors of the Evansville & Newburg Suburban Company and the Evansville & Ohio Valley Railroad will make demands upon these companies for the same scale of wages granted on the Princeton line.

City May Act in Paving Case.—A resolution calling on the Birmingham Railway, Light & Power Company, Birmingham, Ala., to pave Tuscaloosa Avenue from Sixth to Poplar Streets, a distance of about 2 miles has been adopted by the City Commission. The commission has set June 15 as the date by which the company must start work. Lee C. Bradley, receiver for the company, informed the commission that the company's portion of the paving on Tuscaloosa Avenue will amount to \$157,000 and that other paving is demanded in other parts of the city, which amounts to \$750,000. He stated that no date on which work can be begun can be stated at this time. The city is ready to proceed with the paving, which was held up on account of the war. Legal steps will probably be taken by the city in the Federal Court in an effort to enforce the work if it is not started by June 15.

Increase for Hull Men.—The employees of the Hull (Que.) Electric Railway, including shopmen, conductors and motormen, are granted an all round increase of 3 cents per hour, by the terms of the award of the board of arbitration, which was appointed by the Minister of Labor to adjudicate the dispute between the company and its employees. If the award is accepted by the men, it will mean that third-year motormen and conductors, who were receiving 36 cents an hour will get 39 cents; second-year men who formerly received 34 cents will get 37 cents, and first-year men will jump from 31 and 29 cents to 34 and 32 cents. All shopmen and other employees will get a straight increase of 3 cents an hour, and in addition are granted the nine-hour day, with a provision, that in view of their reduction in hours, they shall not be paid less than they are receiving at present. All overtime is to be paid at the rate of time and a half, and the agreement is to be effective for a period of one year.

Programs of Meetings

American Railroad Association

The annual convention of Section 3, Mechanical, of the American Railroad Association will be held at Atlantic City, N. J., June 18-25. This includes the former Master Car Builders' and Master Mechanics' Associations. Some of the reports and papers of special interest to electric railway officials are at the morning session on Wednesday, June 18, reports and discussions on standards and recommended practice, train brake and signal equipment, brakeshoe and brakebeam equipment.

The Thursday morning session includes a report and discussion on car wheels, specifications and tests for materials, welding truck side-frames, bolsters and arch-bars, couplers and draft gear. At the morning session for Friday there will be a discussion of reports on safety appliances, car construction, car trucks, train lighting and equipment.

On Monday, June 23, there will be a discussion of reports on standards and recommended practice and mechanical stokers. The Tuesday program includes a discussion of the reports on fuel economy, smoke prevention and specifications and tests for materials. Wednesday, the last day of the convention, reports will be presented on design, maintenance and operation of electric rolling stock. There will also be a discussion on that day of reports on train resistance.

Iowa Electric Railway Association

The program was announced on June 5 for the joint session of the Iowa Electric Railway Association with the Iowa section of the National Electric Light Association at the Hotel Colfax, Colfax, Iowa, on June 18 and 19. The papers planned to be presented on the afternoon of June 18 follow:

"Rate Litigation in Iowa," by William Chamberlain, general counsel of the United Light & Railways Company, "Iowa State Board of Conciliation, Its Work and Possibilities," by W. C. Raymond, dean of the Engineering Department of the State University of Iowa.

The session on the morning of June 19 will be devoted almost wholly to business matters. There will, however, be a general discussion of the best pavings to be used in connection with street car tracks, with special reference to the advantages of cement, creosote blocks, brick and asphalt.

The papers to be presented at the session on the afternoon of June 19 are as follows:

"The Safety Car," by T. C. Roderick of the Tri-City Railway.

"Automatic Control of Substations," by C. W. Place, of the General Electric Company.

Following the discussion of these two papers there will be a general discussion of the subject of reclaiming of track and special work by welding and grinding.

Financial and Corporate

Seattle Lines in April

Municipal Railway, Economizing, Hopes to Continue to Operate at a Five-Cent Fare

According to a statement issued by Thomas F. Murphine, superintendent of public utilities, the Seattle (Wash.) Municipal Railway system in April, 1919, had revenues from all sources of \$421,252 and operating expenses of \$331,242, leaving a gross profit of \$90,009. From this amount was deducted \$66,260 for interest on outstanding bonds; \$6,911 for industrial insurance and \$7,000 for accruing damage claims. Depreciation, it is said, was more than offset by extraordinary expenditures in the way of maintenance.

\$9,838 PROFIT IN APRIL

The net profit for the month, therefore, amounted to \$9,838. This sum, it is felt, will be increased in a large amount as soon as the railway is able to put into effect operating economies from time to time submitted to the Council. The only operating economies during April were the elimination of the greater portion of "dead-head" passengers and the discontinuance of operation of the Twelfth Avenue and Ray Street lines.

In April, 1919, the municipal lines operated a total of 27,582 more car hours than were operated in April, 1918, by the combined lines of the Puget Sound Traction, Light & Power Company and the Municipal Railway, Divisions "A" and "C." The municipal lines also operated 274,036 more car miles in April, 1919, than in the corresponding month of last year for both railway systems.

The transportation revenues increased over the corresponding month of last year in the sum of \$60,383 or 17.0 per cent. This was due, in part, to a natural increase in traffic but in a greater part to the increase in the service.

Owing to the increased service and to an approximate 50 per cent increase of wages, trainmen were paid in April, 1919, the sum of \$168,683 and in the corresponding month of last year \$94,375, an increase of \$74,308. The wages paid in the maintenance departments were correspondingly increased.

ECONOMIES INTRODUCED AND PLANNED

On June 1 the municipal lines began to install skip stops and will continue this work until all lines will operate under the plan. It is expected that this will show a saving of approximately \$8,000 per month.

The municipal railway management believes that by putting into effect the operating economies recommended and discontinuing non-revenue producing

lines that give practically no service to the public and not being compelled to operate non-profitable extensions of the system and various experimental transportation schemes it will be able on a 5-cent fare to pay all operating expenses, all interest on the bonds and set aside an amount sufficient to retire the bonds.

Monongahela Earnings Fall

Net Surplus for 1918 Dropped 37 Per Cent Because of Higher Operating Costs

The financial results of the operation of the Monongahela Valley Traction Company, Fairmont, W. Va., for 1918 were not flattering, in the company's opinion, for notwithstanding normal increases in the volume of patronage the net surplus for the year decreased \$361,588, or more than 37 per cent, as compared with the previous year. The net earnings decreased \$194,576 during the year, due principally to the great increase in operating expenses growing out of the raises in wages and the greatly increased cost of materials and supplies. The detailed figures for 1918 are given in the accompanying statement.

INCOME STATEMENT OF MONONGAHELA VALLEY TRACTION COMPANY FOR 1918	
Gross earnings from operation.....	\$3,787,328
Operating expenses, taxes, insurance and depreciation.....	2,613,659
Net earnings from operations.....	\$1,178,669
Fixed charges.....	586,866
Net surplus for the year.....	\$591,803
Surplus balance on Dec. 31, 1917.....	320,965
Total.....	\$912,768
Less adjustment of accounts for previous years.....	769
Balance to credit of profit and loss before dividends.....	\$904,999
Dividends paid during 1918.....	616,657
Surplus balance on Dec. 31, 1918.....	\$288,342

Fully realizing that the maintenance of dividends is wise, in order to maintain the high standards of credit which the company has always enjoyed, the officers regret that, because of the effects of high operating costs and large construction expenditures upon the company earnings, they found it necessary to discontinue the common stock dividend.

It is, however, the belief of the officers of the company that the Public Service Commission will grant relief by allowing increases of rates for certain classes of service, in answer to the petition which is now before it, as these increases are requisite to the further financing which the company must do at once because of the rapidly growing communities in its territory.

St. Louis Suit Dragging

Testimony Shows Probable Errors of Business Judgment Rather Than Deliberate Waste

The power contracts of the United Railways, St. Louis, Mo., from 1903 through 1918 constituted the principal bone of contention at the hearings during the week ended June 7, before Special Master Lamm at St. Louis in the receivership suit of John W. Seaman, New York, a stockholder of the United Railways.

POWER CONTRACTS CRITICISED

One of the allegations of the Seaman petition is that the letting of power contracts in 1913 and 1914 by the United Railway directors, several of whom were also directors of the North American Company, which controls the power distributing concern, constituted a waste of the railway's funds in that excessive rates were paid and huge profits made by the sellers of the power.

The testimony of W. E. Bryan, superintendent of power stations for the United Railways, developed the statement that the company in 1913 paid for 49,688,913 kilowatts though it used only 40,12,696 kilowatts and that in 1914 it paid for 107,418,815 kilowatts though it used only 98,483,900 kilowatts. The value of the difference between the power used and the power paid for in these two years was referred to as \$140,000.

In answer to a question from the attorney for Mr. Seaman for an explanation of the difference between the amounts of power used and the amounts paid for, the witness explained that the higher figures represented the amounts of power contracted for and the lower figures the amounts that the company was able to use.

On the following day Mr. Bryan testified that for six years prior to 1908, when the contract was made, the load of the company had increased 51,743,576 kilowatts. If the load had increased for the next six years at the same rate, the company would have been using 220,000,000 kilowatts in 1914. Instead the load fell below the average of the previous six years, and the company found itself with more power than it could use.

LONG-TERM CONTRACT NECESSARY

The special master inquired whether the railway could not have contracted for power on a sliding scale to fit its needs. To this the witness replied that the successful promotion of the Keokuk hydro-electric power project depended upon the ability of the promoters to sell an amount of electricity sufficient to carry the fixed charges on their investment. For that reason the railway was required to contract for a stated amount.

To refute previous testimony Attorney Rassiour, for the defendant, brought out testimony showing that the railway could not have operated its own plants for the production of power as cheaply as it was able to buy both

steam and water power from outside sources. There followed a long, bitter and complicated argument between the opposing attorneys concerning the methods used by various witnesses for calculating the cost of the current involved. The controversy was settled by the special master allowing the testimony to stand with the comment that he would rather err on the side of admission of testimony than of excluding it.

The salaries of attorneys and other employees of the United Railways before the receivership and of those appointed and retained by the receiver also consumed a good deal of time and developed considerable acrimony.

Abandoned Road Is Sold

The entire property of the Parkersburg & Ohio Valley Electric Railway, Fairmont, W. Va., has been sold at public auction. The successful bidder was the Wilkoff Company, dealers in scrap iron at Pittsburgh, Pa., and Youngstown, Ohio. That company's bid was \$16,000. It is understood that the purchasers will scrap the property, which consists of 4.6 miles of track and several bridges and trestles. The company never owned any rolling stock, the single car which was operated over it for a time being borrowed from the Union Traction Company, Sistersville, which also furnished the power. The road had not been operated for the last five years, during which time it has been in the hands of C. L. Williams, Parkersburg, as receiver.

The sale was made under an agreed order of the United States District Court. It was conducted by Judge M. H. Willis, New Martinsville, a special commissioner. It was cried by John Mitchell and by Judge Willis, himself. The bidding started off at \$7,500, the road being first sold in sections. It was then put up as a whole and the bid of the Wilkoff Company for the entire property was the highest and best.

\$41,183,112 Bay State Valuation

The Public Service Commission of Massachusetts has issued an order in which it finds that the present amount of capitalization of the Eastern Massachusetts Street Railway, which is the reorganized Bay State Street Railway, as required under provision of the Bay State reorganization act, is \$41,183,112. This was determined as follows:

Computation of investment value as of Nov. 1, 1914, \$40,282,340; additions and improvements submitted to the commission, minus the value of property sold or otherwise disposed of, \$1,866,516, making a total of \$42,148,856.

From this total the commission deducted the amount of adjustment to represent the value on a 6 per cent basis of the rentals payable on account of properties of the railways leased by the Bay State within Massachusetts, amounting to \$965,744. This leaves a net valuation of \$41,183,112.

Brighter Returns in February

Railway Net Income Improves, but Increased Labor Costs Are Reflected in Transportation Expenditures

Operating reports of electric railways for the month of February, 1919, compiled by the information bureau of the American Electric Railway Association and presented herewith would seem to indicate when compared with the same figures for February, 1918, that for the first time in many months the increase in the operating revenues is beginning to approach within hailing distance of the increase in operating expenses. Or perhaps it would be more proper to say that the increase in operating expenses has been retarded enough to enable the increase in operating revenues to creep up a bit on it.

DIFFICULT TO INTERPRET RESULTS

Whether this showing is due to an actual improvement in operating conditions, a belated realization of the fruits of the numerous fare increases, or whether it is entirely due to the bad weather conditions prevailing in 1918, especially in the East, it is difficult to say. However, a few months will tell the story without doubt, for then the returns for the late spring and early summer months will be in and a comparison can be made that will not be rendered valueless by different weather conditions. At that time it will be possible to tell with some degree of accuracy the tendency of operating conditions.

As it is, there appear to be some encouraging signs, but the outlook is still far from bright. For the country as a whole the net income per car-mile decreased 6.50 per cent. This is the smallest decrease that has been recorded for many months. This good showing, however, is probably due entirely to conditions in the East where the heavy winter storms of 1918 brought operation almost to a standstill and made possible the apparent increase in net income in 1919. In the South and West, which were not so hard hit by the 1918 storms, the net income decreased 52.89 and 76.29 per cent respectively.

OPERATING REVENUES INCREASE

Operating revenues per car-mile for the country as a whole increased 14.20 per cent while the expenses increased 19.89 per cent. This showing is, comparatively speaking, not so bad, but again the apparent improvement is largely due to the weather conditions in 1918. In the East, where the storms were severest, the revenues actually increased more than the expenses, the amounts being 16.93 and 14.14 per cent respectively. This accounts for the favorable showing in this respect for the country as a whole, for in the South the increase in revenues per car-mile was 15.35 per cent and in expenses 33.92 per cent, while in the West the increase in revenues was 11.85 per cent and in expenses 22.16 per cent.

The operating ratio for the month also reflects the same situation. For the country as a whole it increased from 74.40 in February, 1918, to 77.20 in February, 1919. In the East it dropped from 82.00 to 80.05 during the same period, while in the South it rose from 60.09 to 70.70 and in the West it jumped from 68.75 to 75.00.

In Table IV the operating expenses per car-mile are shown in detail. An examination of them reveals some interesting facts. No single item in any section of the country shows a decrease except power in the East. This of course is due to the weather conditions in this district referred to again and again in the discussion of these tables. The amount of power produced was reduced and the overhead going on as before the cost of production per unit increased.

The high cost of materials is reflected in the equipment account. The cost per car-mile for this department increased 18.03 per cent for the country, rising from 3.16 cents per car-mile to 3.73 cents per car-mile. The greatest increase in this account is shown in the South, 55.31 per cent, while the greatest actual amount paid occurs in the East, 4.42 cents per car-mile for February, 1919, compared with 2.73 cents in the South and 3.25 cents in the West.

POWER COSTS INCREASE MODERATE

The increase in the cost of power per car-mile is moderate, being 6.18 per cent for the country and 9.45 per cent in the West, the East showing a decrease of 0.78 per cent, as before mentioned. In the South it is impossible to calculate the actual increase because many of the companies do not separate their power costs from the cost of conducting transportation.

The increase in the cost of conducting transportation is more uniform throughout the country than the increase in the other accounts, reflecting the general increase in the cost of labor. For the country the increase was 17.40 per cent per car-mile, while in the East the increase was 14.78 per cent, in the South 25.77 per cent and in the West 18.25 per cent. The figures for the South are complicated by the fact before mentioned that a number of companies include the cost of power in their transportation costs.

In Table V the combined income statement for February, 1919, of 139 companies is shown and the same statement is shown in cents per car-mile in Table VI. In the same way Table VII gives in detail the combined operating expenses of 161 companies for the same month, while in Table VIII these expenses are shown in cents per car-mile.

If reference is made to the similar tables for January, published in the issue of April 26, it will be seen that

TABLE I—INCOME STATEMENT FOR FORTY-FOUR ELECTRIC RAILWAYS, FEBRUARY, 1919, COMPARED WITH FEBRUARY, 1918

	United States		East		South		West	
	1919	1918	1919	1918	1919	1918	1919	1918
Operating revenue.....	\$8,620,117	\$7,192,497	\$4,206,094	\$3,437,856	\$666,715	\$579,736	\$3,747,308	\$3,174,905
Operating expenses.....	6,645,641	5,354,115	3,367,478	2,820,804	471,674	353,740	2,806,489	2,180,271
Net operating revenue.....	1,974,476	1,838,382	838,616	617,052	195,041	226,696	940,819	994,634
Net revenue from auxiliary operations.....	79,138	723	64,447	11,148	11,498	15,993	15,993	723
Taxes.....	589,557	479,332	252,716	192,064	78,954	66,701	257,887	200,567
Operating income.....	1,464,107	1,359,775	640,347	424,988	127,235	159,995	696,525	774,790
Non-operating income.....	4,856,611	3,003,619	2,222,214	1,422,243	160,977	199,765	37,537	33,867
Gross income.....	1,896,832	1,153,648	874,561	647,231	288,209	359,760	734,062	808,657
Deductions from gross income.....	1,727,228	1,644,423	805,949	747,592	223,667	230,372	697,612	676,459
Net income.....	169,604	127,225	68,612	*100,361	64,542	129,388	36,450	132,198
Operating ratio (per cent).....	77.20	74.40	80.05	82.00	70.70	60.09	75.00	68.75
Car-miles operated.....	23,199,807	22,224,749	10,609,843	10,140,818	2,062,528	2,073,288	10,527,436	10,160,643

TABLE II—INCOME STATEMENT IN CENTS PER CAR-MILE FOR THE FORTY-FOUR ELECTRIC RAILWAYS SHOWN IN TABLE I, FOR FEBRUARY, 1919, COMPARED WITH FEBRUARY, 1918

	United States			East			South			West		
	1919	1918	Per Cent Increase	1919	1918	Per Cent Increase	1919	1918	Per Cent Increase	1919	1918	Per Cent Increase
Operating revenue.....	37.15	32.40	14.20	39.64	33.90	16.93	32.32	28.02	15.35	35.48	31.75	11.85
Operating expenses.....	28.65	24.10	19.89	31.73	27.80	14.14	22.82	17.04	33.92	26.63	21.80	22.16
Net operating revenue.....	8.50	8.30	2.40	7.91	6.10	29.67	9.50	10.98	13.47	8.85	9.95	11.06
Net revenue from auxiliary operations.....	0.34	2.16	17.40	0.51	1.89	25.93	0.54	3.23	19.17	0.13	2.21	10.41
Taxes.....	2.58	1.64	2.65	4.04	4.21	43.47	6.19	7.75	20.13	6.54	7.75	16.01
Operating income.....	6.30	6.14	2.63	6.04	2.1	19.01	6.19	9.65	19.07	6.54	0.34	5.88
Non-operating income.....	1.87	2.03	9.03	2.21	6.40	28.14	7.81	17.40	19.51	6.90	8.09	14.71
Gross income.....	8.17	8.17	0.00	8.25	7.33	2.98	10.82	10.65	1.00	10.65	9.79	7.67
Deductions from gross income.....	7.45	7.40	0.80	7.59	6.07	9.77	3.18	6.75	63.89	0.31	1.33	76.89
Net income.....	0.72	0.77	6.50	0.66	82.00	2.38	70.70	60.09	17.66	75.00	68.75	9.09
Operating ratio (per cent).....	77.20	74.40	3.76	80.05	82.00	2.38	70.70	60.09	17.66	75.00	68.75	9.09
Car-miles operated.....	23,199,807	22,224,749	4.39	10,609,843	10,140,818	4.62	2,062,528	2,073,288	0.52	10,527,436	10,160,643	5.16

TABLE III—OPERATING EXPENSES OF SIXTY COMPANIES FOR FEBRUARY, 1919, COMPARED WITH FEBRUARY, 1918

	United States		East		South		West	
	1919	1918	1919	1918	1919	1918	1919	1918
Operating expenses.....	\$7,282,803	\$6,076,555	\$3,695,082	\$3,295,669	\$650,021	\$482,441	\$2,937,700	\$2,298,445
Way and structures.....	740,318	613,141	389,820	350,242	65,629	43,821	284,869	219,078
Equipment.....	2,860,610	2,920,904	474,807	479,399	51,986	52,778	363,822	260,887
Power.....	1,208,135	1,168,188	773,087	739,970	42,932	8,511	492,116	429,707
Conducting transportation.....	3,081,010	2,512,877	1,475,444	1,220,887	359,547	285,996	1,246,019	1,005,994
Traffic.....	1,004,187	927,009	484,722	473,278	1,444	1,325	2,493	16,482
General and miscellaneous.....	1,004,187	927,009	484,722	473,278	98,602	88,882	420,863	365,349
Transportation for investment—Cr.....	5,283	513					5,283	513
Car-miles operated.....	26,238,736	25,115,356	12,105,077	11,491,650	2,945,945	2,947,035	11,187,714	10,676,671

¹ Includes \$139,346 for depreciation and other expenses not divided among sub-accounts. ² Includes \$24,425 for depreciation and other expenses not divided among sub-accounts. ³ Includes \$20,534 for express department not divided among sub-accounts. ⁴ Includes \$19,689 for express department not divided among sub-accounts. ⁵ Includes \$118,812 depreciation not divided among sub-accounts. ⁶ Includes \$4,816 depreciation not divided among sub-accounts.

TABLE IV—OPERATING EXPENSES IN CENTS PER CAR-MILE FOR THE SIXTY COMPANIES SHOWN IN TABLE III, FOR FEBRUARY, 1919, COMPARED WITH FEBRUARY, 1918

	United States			East			South			West		
	1919	1918	Per Cent Increase	1919	1918	Per Cent Increase	1919	1918	Per Cent Increase	1919	1918	Per Cent Increase
Operating expenses.....	27.74	24.19	14.67	30.53	28.67	6.48	22.05	16.36	34.77	26.25	31.52	21.97
Way and structures.....	2.82	2.44	15.57	3.22	3.05	5.57	2.23	1.49	49.66	2.54	2.05	23.90
Equipment.....	10.83	11.68	0.83	10.90	11.77	9.97	2.78	1.79	55.31	3.25	2.43	33.74
Power.....	4.98	4.69	1.18	6.39	6.44	0.78	1.46	2.09	403.44	4.40	4.02	9.45
Conducting transportation.....	11.77	10.00	17.40	12.19	10.62	14.78	12.20	9.70	25.77	11.14	9.42	18.28
Traffic.....	0.13	0.10	18.18	0.14	0.10	0.40	0.04	0.08	50.00	0.15	0.15	15.35
General and miscellaneous.....	3.83	3.69	3.79	4.00	4.12	2.92	3.34	3.01	10.96	3.76	3.42	9.94
Transportation for investment—Cr.....	0.02	0.02								0.06	0.06	
Car-miles operated.....	26,238,736	25,115,356	4.47	12,105,077	11,491,650	5.34	2,945,945	2,947,035	0.04	11,187,714	10,676,671	4.79

¹ Includes 0.53 cent per car-mile for depreciation and other expenses not divided among sub-accounts. ² Includes 0.10 cent per car-mile for depreciation and other expenses not divided among sub-accounts. ³ Includes 0.17 cent per car-mile for express department not divided among sub-accounts. ⁴ Includes 0.17 cent per car-mile for express department not divided among sub-accounts. ⁵ Includes 1.06 cents per car-mile for depreciation not divided among sub-accounts. ⁶ Includes 0.045 cent per car-mile for depreciation not divided among sub-accounts. ⁷ A number of companies in the South include the cost of power under conducting transportation which accounts for the apparent disparity in these figures.

TABLE V—INCOME STATEMENT OF 139 COMPANIES FOR FEBRUARY, 1919

	United States		East		South		West	
	1919	1918	1919	1918	1919	1918	1919	1918
Operating revenue.....	\$22,147,896	\$15,419,533	\$1,620,154	\$5,108,209				
Operating expenses.....	17,158,055	12,121,570	1,156,843	3,879,644				
Net operating revenue.....	4,989,841	3,297,963	463,311	1,228,567				
Net revenue from auxiliary operations.....	642,321	231,992	346,810	63,519				
Taxes.....	1,563,884	1,047,919	182,339	330,626				
Operating income.....	4,071,278	2,482,036	627,782	961,460				
Non-operating income.....	785,533	521,583	173,928	90,022				
Gross income.....	4,856,811	3,003,619	801,710	1,048,482				
Deductions from gross income.....	5,116,063	3,526,954	570,494	1,018,615				
Net income.....	*259,252	*523,335	231,216	32,867				
Operating ratio (per cent).....	77.47	78.61	71.40	75.95				
Car-miles operated.....	56,777,307	37,093,849	4,895,502	14,787,956				

TABLE VI—AMOUNTS PER CAR-MILE OF THE INCOME STATEMENT FOR THE 139 COMPANIES SHOWN IN TABLE V.

	United States		East		South		West	
	1919	1918	1919	1918	1919	1918	1919	1918
Operating revenue.....	39.01	41.57	33.09	34.54				
Operating expenses.....	30.22	32.68	23.63	26.24				
Net operating revenue.....	8.79	8.89	9.46	8.30				
Net revenue from auxiliary operations.....	1.13	0.63	7.08	0.43				
Taxes.....	2.75	2.83	3.72	2.24				
Operating income.....	7.17	6.69	12.82	6.49				
Non-operating income.....	1.38	1.41	3.55	0.61				
Gross income.....	8.55	8.10	16.37	7.10				
Deductions from gross income.....	9.01	9.51	11.65	6.89				
Net income.....	0.46	0.41	4.72	0.21				
Operating ratio (per cent).....	77.47	78.61	71.40	75.95				
Car-miles operated.....	56,777,307	37,093,849	4,895,502	14,787,956				

NOTE.—* Indicates deficit. Figures in *italics* indicate decrease.

TABLE VII—OPERATING EXPENSES OF 161 COMPANIES FOR FEBRUARY, 1919

	United States		East		South		West	
	1919	1918	1919	1918	1919	1918	1919	1918
Operating expenses.....	\$18,096,396	\$12,671,656	\$1,380,385	\$4,044,895				
Way and structures.....	1,873,395	1,281,194	155,909	436,292				
Equipment.....	2,426,159	1,711,820	192,975	521,364				
Power.....	2,897,474	2,115,692	118,570	673,211				
Conducting transportation.....	7,952,987	5,544,126	705,948	1,662,649				
Traffic.....	162,633	133,158	8,286	22,642				
General and miscellaneous.....	2,448,681	1,670,854	202,157	575,670				
Transportation for investment—Cr.....	6,533	516						6,017
Car-miles operated.....	60,480,181	38,886,285	5,919,114	15,674,782				

¹ Includes \$342,140 depreciation not divided among sub-accounts. ² Includes \$223,328 depreciation not divided among sub-accounts. ³ Includes \$118,812 depreciation not divided among sub-accounts.

TABLE VIII—AMOUNTS IN CENTS PER CAR-MILE OF THE OPERATING EXPENSES OF THE 161 COMPANIES SHOWN IN TABLE VII, FOR FEBRUARY, 1919

	United States		East		South		West	
	1919	1918	1919	1918	1919	1918	1919	1918
Operating expenses.....	29.93	32.58	23.32	25.80				
Way and structures.....	3.10	3.29	2.63	2.76				
Equipment.....	4.01	4.40	3.26	3.33				
Power.....	4.79	5.44	2.00	4.23				
Conducting transportation.....	13.15	14.23	11.93	10.93				
Traffic.....	0.27	0.35	0.08	0.14				
General and miscellaneous.....	4.05	4.30	3.42	3.67				
Transportation for investment—Cr.....	0.01							0.04
Car-miles operated.....	60,480,181	38,886,285	5,919,114	15,674,782				

¹ Includes 0.57 cent per car-mile for depreciation not divided among sub-accounts. ² Includes 0.57 cent per car-mile for depreciation not divided among sub-accounts. ³ Includes 0.76 cent per car-mile for depreciation not divided among sub-accounts.

there is apparently a slight improvement shown in the figures for February. The revenue per car-mile increased, while the net loss per car-mile is considerably less.

CLASSIFICATION UNCHANGED

As in the past the returns from city and interurban electric railways 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. The tables showing the figures in detail are on page 1189.

Company Accepts Valuation

Minneapolis Street Railway Agrees to Council Figure of \$24,000,000 with 7 Per Cent Return

The Minneapolis, (Minn.) Street Railway, included in the system of the Twin City Rapid Transit Company, on June 6 accepted the proposed \$24,000,000 valuation of its property as a basis for a cost-of-service franchise with a 7 per cent annual return.

The Council has appropriated \$1,500 for expenses in franchise draft and voted to employ B. J. Arnold, Chicago, Ill., to check over an item of \$1,125,938 addition to the capital value of the company between Jan. 1, 1916, and Jan. 1, 1919, as stated by the directors of the company.

This amount was included in the company's offer of a valuation of \$24,500,000 as subject to being verified, and is still subject to verification, although the compromise of \$24,000,000 has been accepted. If this verification is not made the figure of \$24,000,000 will be lowered. Otherwise it will remain as the franchise basis.

PRESIDENT LOWRY'S LETTER

The letter of acceptance of the valuation by the company, signed by Horace Lowry, president of the railway, read in part:

The report of your special committee on street railway matters and extensions adopted May 23, offering this company a valuation of \$24,000,000 for its property for a franchise, rate making and purchase purposes, with a maximum rate of return thereon of 7 per cent per annum and providing for compensating this company for procuring new money required for future extensions has been duly submitted to and considered by the board of directors of this company.

I am authorized to state that in the opinion of the board of directors said valuation is less than the fair value of the property as of Jan. 1, 1919, and that the return to the company therein provided will not sufficiently compensate the stockholders whose money has been invested in the development of the property.

Fully appreciating, however, the great value to the community of having the franchise negotiations completed without further delay and railway service restored to its former high standard, and believing that under a modern cost-of-service franchise there will be close co-operation between the city and this company, the board of directors have authorized me to accept the offer of your honorable body as set forth in the report of your special committee on railway matters and extensions and the same is hereby accepted.

City Attorney C. D. Gould expects to be able to present a franchise draft to the City Council by July 1. He has been working on it several months. Changing conditions have required practically an entirely new draft and the attorney will devote his entire time to the work. One of the features that makes the work more difficult is the relationship between the Minneapolis Street Railway and the St. Paul Street Railway, both controlled by the Twin City Rapid Transit Company. There are now four interurban lines with 10-cent fares between the cities, and the spread of the halves of the fare is an intricate question under two franchises and two different Councils. The St. Paul franchise permits no increase in the 5-cent fare locally without vote of the people. It is said by Minneapolis officials that the Minneapolis end is carrying an unequal burden of the cost of the service as related to revenue.

Protest Against Abandonment

The application of the Union Savings Bank & Trust Company, Cincinnati, Ohio, as trustee for the holders of the first mortgage bonds of the Cincinnati & Columbus Traction Company to discontinue the service and operation of the company, was heard recently by the Public Utilities commission. W. S. Little, attorney, representing the bank, declared the road was operating at an approximate loss of \$2,300 a month, and consequently could not be expected to continue in operation indefinitely.

Citizens who reside along the road maintained that discontinuance would abrogate certain contract rights and would work great damage and inconvenience to citizens who have been accustomed to use the road for passenger and freight purposes.

Kansas Assessments Announced

Samuel T. Howe, chairman of the State Tax Commission of Kansas, is one of the officials of that State who is fully aware of the plight of the electric railways. He has seen a decrease in utility values for the year of \$1,645,370, of which the street and interurban railway loss is \$622,611. Of these properties he said recently:

One company, the property of which was assessed by the state board in 1918 at \$147,740, was assessed this year at \$75,000. This company is bankrupt. A mortgage was foreclosed and the property was bid in at the master's sale at the amount at which it is assessed, and at the sale were proprietors of other companies who were bidding on the property of this company for junk purposes.

The railway in Fort Scott has been abandoned. The rails remain in the streets because they are not worth removing.

Practically the same is true as to the city of Parsons. The street railway there has been trying to give its property to the city. The investment is practically lost, and so of others which might be mentioned.

The Kansas City Railways shows a loss of \$188,336, chiefly on the lessened value of its rolling stock used in the state.

In only few instances—and these exceptional as to traffic conditions—have the properties remained as valuable as they were a year ago.

Subsidy for Summer Resort Railway

Following a conference between city officials of Ocean City, N. J., and representatives of the Ocean City Electric Railroad it was decided by the former to make application to the Court of Chancery for the appointment of a trustee to operate the road during the present summer. It is expected that cars will be running over the line again in a short time. The company's representatives have previously declared that it was not the purpose of the corporation to operate the line this season.

The city will accordingly run the road during the summer and if there is a deficit when the summer season is closed the sum will have to be made up by the city. The average loss to the company in operating the road during the past two or three years has been about \$175 a year. When the railway announced that it could no longer operate the road the city authorities decided that the suspension of service would injure business during the summer and adopted the plan of guaranteeing the company against loss.

The conference at which arrangements were made for operating the road was held in Philadelphia and was attended by Mayor Champion and the city commissioners of Ocean City, City Solicitor Boswell, for the city, and Daniel Steelman and William G. Moore, a committee representing bondholders of the company, William D. Sherrerd, secretary of the company, and J. Fithian Tatem, solicitor for the corporation.

Chancellor Edwin Robert Walker at Trenton has appointed William E. Massey, Ocean City, as trustee to operate the Ocean City Railway, until October 1, next. Mr. Massey is to serve without compensation and is allowed to spend \$5,000 on repairs and improvements. He is under \$10,000 bonds and must turn the road back to the company in as good a condition as it was when it was turned over to him.

Eastern Massachusetts Street Railway Succeeds Bay State

The Eastern Massachusetts Street Railway succeeded the Bay State Street Railway at Boston on June 1 and the system is now being operated by public trustees in accordance with recent legislation. Homer Loring, Boston, a pioneer in service-at-cost legislation, is chairman of the trustees, he others being Arthur G. Wadeigh, Frederick J. Crowley, Isaac Sprague and Earle F. Charlton. Under the public control act fares must be established on a service-at-cost basis within sixty days. The trustees gave an open hearing upon the road's problems at Boston on June 6, at which Chairman Loring stated that the estimated deficit for the first year of public operation under present fares is \$2,083,700. The trustees plan hearings in the communities served by the road in advance of the fare determination.

Financial News Notes

West End Will Refund Notes.—The West End Street Railway, Boston, Mass., operated under lease by the Boston Elevated Railway, has petitioned the Massachusetts Public Service Commission for permission to issue refunding bonds to the amount of \$1,581,000 to take the place of three-year notes issued on Aug. 1, 1916.

Connecticut Line Leased.—The Hartford & Springfield Street Railway, Warehouse Point, Conn., has completed arrangements whereby it will operate the Suffield Street Railway, which extends from Spencer's Corner, Suffield to the State line. The road will be operated under a lease from the Connecticut Company.

Additional Monongahela Notes.—A banking syndicate headed by the Fidelity Trust Company, Baltimore, Md., is offering at 99 and interest, to yield 7½ per cent, \$2,000,000 one-year 6 per cent note of the Monongahela Valley Traction Company, Fairmont, W. Va., proceeds to be applied to the completion of payments on a power plant costing \$3,000,000, extensions, etc.

Car Trust Certificates Authorized.—The Tennessee Railroad & Public Utilities Commission has authorized the Nashville Railway & Light Company to purchase ten new cars, estimated to cost about \$57,980. The company will issue car trust certificates for \$33,425 of this amount. The cars, it is stated, will be purchased from the American Car Company, St. Louis, Mo.

Protests Against Receiver's Certificates.—An appeal from the order of Federal Judge Julius M. Mayer authorizing the issuance of \$20,000,000 of receiver's certificates by the Brooklyn (N. Y.) Rapid Transit Company has been filed by the Central Union Trust Company, New York. The appeal has been set for argument before the United States Circuit Court of Appeals on June 18.

Offers Northern Ohio Bonds.—The National City Company, New York, N. Y., is offering for subscription at 96 and interest to yield about 6½ per cent \$4,600,000 of seven-year 6 per cent secured gold bonds of the Northern Ohio Traction & Light Company, Akron, Ohio, dated June 1, 1919, and due June 1, 1926. The interest on these bonds is payable on June 1 and Dec. 1. The bonds are in denominations of \$1,000, \$500 and \$100.

Sale of Illinois Road Postponed.—The sale of the assets of the Southern Traction Company, East St. Louis, Ill., announced for June 10, has been postponed until July, the exact date not having been determined yet, on an order entered in the United States District Court at Urbana by Federal Judge English. The order stipulates that the entire purchase price shall be paid in cash. The road was promoted by the Lorimer interests and was built in part, but it was never operated.

Interest Unpaid on Washington Utilities Notes.—The interest due on June 1, on the 5 per cent collateral trust notes of the Washington (D. C.) Utilities Company remains unpaid. The holders of the notes are asked to deposit them with the American Security & Trust Company, or the Metropolitan Trust Company, New York, N. Y. The notes are secured by \$2,750,000 of stock of the Washington Railway & Electric Company, which company passed the May 1, 1919, dividend.

Authorized New Orleans Interest Payment.—Judge Foster in the United States District Court at New Orleans, La., on May 29, ordered J. D. O'Keefe, receiver of the New Orleans Railway & Light Company, New Orleans, La., to pay \$28,482 interest due on June 1 on the \$1,000,000 loan by the War Finance Board. The principal of the loan was also due on June 1, but the War Finance Board has expressed its willingness not to press the payment of the principal at this time. The total of the debt has been reduced to \$940,000, bonds to the extent of \$60,000 having been retired.

Suggests Successor as Receiver.—Former Judge Clarence L. Cole, appointed receiver of the Atlantic Shore Railway, Atlantic City, N. J., three years ago, has asked to be relieved of

the office, and suggests that A. J. Purinton, superintendent of the system, be named as his successor. The company was forced into the hands of a receiver by the keen competition of the jitneys. The city came to the rescue of the railway by passing an ordinance prohibiting jitneys from operating along Atlantic Avenue, the principal thoroughfare of the city. The prospects are said to be good for lifting the receivership soon.

Abandonment Approved.—By a vote of five to three, the City Council of Seattle, Wash., sustained Thomas F. Murphine, superintendent of public utilities, in suspension of operation on the two-block shuttle line on Queen Anne Hill, known as the Ray Street line. The service was discontinued when Mr. Murphine adopted the policy of cutting out the nonpaying railway lines, especially where only a few patrons were served. It is proposed to discontinue other service that does not produce revenue, and the Council's action is regarded as an indication that Mr. Murphine is to be given practically a free hand in managing the Municipal Railway.

Short Bond Extension Planned.—An effort is being made to extend for fourteen months the \$95,000 of first mortgage 5 per cent bonds of the Ohio Central Traction Company, assumed in the consolidation with the Cleveland, Southwestern & Columbus Railway, Cleveland. This would make the bonds mature on Aug. 1, 1920, at which time the company has other maturing issues. As consideration, the company proposes to make an immediate cash payment of \$23.33 on each \$1,000 bond and to attach three new coupons at the rate of 5 per cent, said coupons maturing on Dec. 1, 1919, June 1, 1920, and Aug. 1, 1920. Thus, the bonds will net the holders 7 per cent during the period of the extension. The priority of the lien will be preserved in every respect. Of the original issue of \$200,000, all but \$95,000 have been paid or exchanged for other bonds maturing in 1923. Those holders who assent to the plan are asked to deposit with the New Haven Trust Company, trustee, New Haven, Conn. With the war financing out of the way, the company believes it will have no difficulty in paying the bonds on Aug. 1, 1920.

Electric Railway Monthly Earnings

CITIES SERVICE COMPANY, NEW YORK, N. Y.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Apr., '19	\$1,807,255	\$63,076	\$1,744,179	\$172,745	\$1,571,434
1m., Apr., '18	1,885,750	37,254	1,848,496	212	1,848,284
3m., Apr., '19	21,913,980	628,793	21,285,187	872,653	20,412,534
3m., Apr., '18	20,127,716	380,001	19,747,715	2,635	19,745,080

CLEVELAND, PAINESVILLE & EASTERN RAILROAD,

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Mar., '19	\$49,158	\$34,324	\$14,934	\$14,245	\$688
1m., Mar., '18	42,252	\$27,210	15,042	11,421	3,621
3m., Mar., '19	149,960	\$99,848	41,112	46,625	15,513
3m., Mar., '18	118,422	\$81,683	36,739	34,062	2,677

LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charge*	Net Income
1m., Mar., '19	\$185,807	\$142,176	\$43,631	\$35,988	\$7,643
1m., Mar., '18	164,940	*121,542	43,398	36,228	7,170
3m., Mar., '19	551,627	*435,383	116,294	107,833	8,461
3m., Mar., '18	447,657	*348,220	99,437	108,650	19,213

REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charge*	Net Income
1m., Apr., '19	493,363	\$349,797	*143,566	\$114,036	\$29,530
1m., Apr., '18	463,194	\$331,863	131,330	102,783	\$28,548
4m., Apr., '19	2,046,930	*1,480,041	566,900	453,306	\$134,774
4m., Apr., '18	1,889,226	*1,385,342	503,884	401,355	\$137,872

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Apr., '19	\$882,220	\$619,380	\$262,840	\$157,420	\$105,420
1m., Apr., '18	776,967	555,212	221,755	155,561	66,194
1m., Apr., '19	3,500,724	2,595,773	904,951	626,921	278,030
4m., Apr., '18	3,234,557	2,436,302	798,055	61,690	176,365

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

Traffic and Transportation

Protests Fare Reduction

Galveston Company Contends There Has Been No Change From War Conditions

Luke C. Bradley, district manager of Stone & Webster, and formerly manager of the Galveston (Tex.) Electric Company, presented to the Mayor and City Commissioners on June 4 a statement giving the reasons of the company for combatting the proposal to reduce fares in Galveston from 6 to 5 cents.

Mr. Bradley showed that 291 American cities had come to the rescue of the electric railways by permitting increases in fare and declared that in not a single instance have these rates been reduced, as the conditions which rendered them necessary still obtain.

He showed that the increase of 1 cent in the Galveston fare had resulted in an increase of \$80,500 a year in revenue and that the increase in wages of motormen and conductors, based on the 6-cent fare, amounted to \$82,545, or \$2,045 more than the increase produced, demonstrating that every cent of the increase was applied to local wages.

PLATFORM EXPENSE HAS DOUBLED

Before the days of the high cost of living, Mr. Bradley said, the company paid conductors and motormen \$93.625 a year, while now they are paid \$176,170. In addition, wages to other employees have been raised \$33,400 a year.

A statement was submitted, showing the cash actually invested in the property to be \$2,083,331. The earnings of the company, after taxes and depreciation, under a 6-cent fare, yield only 4 per cent return on this money.

Mr. Bradley deprecated any effort to inject prejudice into the discussion and warned that unfair treatment of the company would be a bad way to attract capital, which is essential to the up-building of a great city, and asserted that it was an established fact that the electric railway problem is the greatest facing American cities to-day, and that these problems are only to be solved by co-operation on the part of the cities, their people and the electric railways in a co-ordination of effort to reach a right and fair solution. In this connection he said:

If this fare is reduced in Galveston, it will be the first step toward destroying this property. If an ordinance is passed repealing the 6-cent fare under the conditions which exist to-day, it will stand as the most unfair ordinance ever passed in the history of the city of Galveston since its incorporation. It cannot from any viewpoint be based upon even the suggestion of fairness, and if you commissioners believe in fair play, as I know you do, if you believe in rendering a service to Galveston, if you do not wish to destroy one of the best citizens that Galveston ever had, you cannot, in fairness, reduce this fare.

In closing his communication Mr. Bradley said:

As the newly elected officials of this city it is your duty to investigate fully the affairs of the city. It is your duty to know the truth. If further investigation of facts in connection with this matter is necessary, it is your duty to make it, and we will give you every facility for doing so.

We stand ready to go hand in hand with Galveston to the greatest destiny the most optimistic of you can hope for. We stand ready to do our full share. We have always done this and we do not now shrink our duty. All we ask is that the employees of this company be protected, and the money which we have invested here safeguarded and a fair return on that investment assured. No thoughtful man can deny the justice of this position, and certainly no money can be obtained to do our part without such assurances.

We have full confidence in the justice and fairness of the people of Galveston and I am glad of this opportunity to present to you the truth and the facts in the case.

Express Rates in Indiana

Ten interurban properties in Indiana were authorized on June 3 by the Public Service Commission to establish local and interline express rates, the new rates to be filed after five days' notice. These express service rates are established on the basis of 150 per cent of first class rates for local traffic and 120 per cent of the local rate for interline traffic, and are computed on the disk scale. The minimum charge for local express, as established by the order of the commission, is 25 cents, and the minimum charge for interline 35 cents.

The order of the commission was made on petition of the various electric railways for merchants' dispatch rates, on account of the fact that the contracts between these companies and the old line express companies were canceled after the express companies were taken over by the federal authorities. The order of the commission also authorized the interurban lines to establish commodity rates on such articles as ice-cream packers and bread baskets.

The express rates, as prescribed by the order, are to be the maximum and will apply to all articles rated in official classification at higher than first class as well as articles of first class and lower. It is also provided in the order that express shipments shall be routed by the shortest and cheapest route.

The companies authorized to establish the express rates are the Fort Wayne & Decatur Traction Company, Fort Wayne & Northern Indiana Traction Company, Indianapolis & Cincinnati Traction Company, Terre Haute, Indianapolis & Eastern Traction Company, Union Traction Company of Indiana, Interstate Public Service Commission, Marion & Bluffton Traction Company, Fort Wayne & Northwestern Railway, Winona Interurban Railway and the Indiana Railways & Light Company.

Jersey Case Near Close

Witness for State Commission Develops Difference of Opinion from Plan Proposed by Railway

The Board of Public Utility Commissioners of New Jersey concluded on June 9 the examination of its own witnesses in connection with the application of the Public Service Railway for permission to establish zone fares. It was decided then to put the hearings over until June 23, when the League of Municipalities will begin the presentation of its case.

Dugald C. Jackson continued his testimony before the commission on June 6. He suggested that the first 5-cent fare cover two zones instead of one as proposed by the company. Unnecessary antagonism of the company's patrons would be worse for the company than the loss of a few hundred thousand dollars by a modification of the zone plan as submitted. Thomas N. McCarter, president of the railway, asked whether it wouldn't be better to get the revenue and antagonize the public than to let the company die. Mr. Jackson didn't think that the company would die. It was his opinion that at the end of six months' trial people would readily consent to a readjustment if they had been convinced in the meantime that the company was doing its best to give all it could for the money and make a reasonable profit.

It was Mr. Jackson's opinion that the fare matter could not be settled once and for all, as conditions were changing constantly. He said that so long as the business continued to grow it would be necessary to experiment with changes in fare. Mr. Jackson said that the shorter zones would be preferable to the 5-cent charge for the first two zones because the relatively short riders would get their rides for a nickel and this would benefit the company by competing directly with the jitneys. The more people who used the cars the more it was to the public's advantage as well as the company's. The two went hand in hand.

Mr. Jackson said his views on the so-called standby and movement charges were somewhat different from those of the company. It would be for the benefit of the passengers if all cars were through cars. The fact that the company did not have to supply through cars on all lines and could not do so showed that transfers were a distinct benefit to the company. He did not think that this should be a charge against the passenger.

According to Mr. Jackson, no electric railway could relieve itself of serious competition from jitneys unless people felt that they were getting as much for their money on the cars as they did on the jitneys. It was important for the company to see the problem from the point of view of its customers. Mr. Jackson agreed with Mr. McCarter that it would be serious to take \$750,000 prospective revenue out of the company's plan, but even that would not be without its advantages.

The examination of Mr. Jackson on June 9 had to do very largely with the effect of fare changes on community development. Mr. Jackson said that where a low fare had been established to encourage suburban development there should be a careful review and study before fares were changed, so as to learn whether circumstances had changed.

He explained that there was a time when the flat rate of fare had been urged in favor of the development of suburban sections and for the prevention of traffic and living congestion, but that conditions in American cities had proved that the flat fare had not eliminated congestion. In reviewing changed suburban conditions, he thought that three factors should be taken into consideration, namely, the citizens' investment in real estate, the citizens' investment in the electric railway and the general and special interests of the entire community.

Wants Municipal Fare Increased

Seattle Councilman Sees Need Now, but Railway Official Wants Present Fare Continued Six Months

Councilman R. H. Thomson of Seattle, Wash., has expressed the belief that the fare on the Seattle Municipal Railway should be increased to 6 cents. Thomas J. Murphine, superintendent of public utilities, asserts that it will be time enough to talk increased fares when it has been demonstrated that the city cannot operate the railway on a 5-cent fare. One reason for Councilman Thomson's proposal to increase the fare is the recent advance allowed by the Public Service Commission on the Seattle & Rainier Valley lines.

Mr. Murphine says that the statement of expenses and revenues in April referred to in detail on page 1187 shows that the city made money on a

5-cent fare. When certain proposed changes are put into effect, he asserts that operating costs will be reduced, and that earnings will show an excess of at least \$50,000 monthly over expenses. Mr. Murphine believes that operation on a 5-cent basis should be continued at least six months before any move toward increased fare is made.

Beginning on June 1, passengers on the Seattle & Rainier Valley Railway and the Greenwood Avenue lines (operated by the Washington Water Power Company), both in Seattle, began to pay increased fares.

As explained elsewhere in this issue, the Rainier Valley lines charge 6 cents for a straight ride in the city limits as far south as Seventy-fifth Street, with 1 cent additional for every transfer issued, and 2 cents for transfers received from other lines.

The Greenwood Avenue fare is advanced by the discontinuance of the city custom of accepting transfers from that line to the city cars. The transfers have been ordered discontinued because Mr. Murphine found that the city was carrying the big end of the load on a 50-50 division of the receipts.

Fares Up in 388 Cities

More Than Fifty-five Per Cent of the Urban Population of United States Paying Increase

Since the publication by the American Electric Railway Association in March of the fare increases in the cities of the United States, several additions and changes have become effective. The fare in New Jersey cities served by the Public Service Railway has been reduced to 6 cents and again advanced to its former level, 7 cents, plus 1 cent for a transfer. Three hundred eighty-nine cities having more than 55 per cent of the urban population of the country are now pay-

ing increased rates. Of this total, twenty-nine cities are paying a 10-cent fare; nineteen an 8-cent fare; 100 a 7-cent fare, seventeen of which pay in additional 1 cent for each transfer; and 164 are paying a 6-cent fare. Fares in the remainder have been increased either by a reduction in the length of zones, the adoption of a zone system, the abolition of reduced rate tickets, or a charge for a transfer. The situation throughout the country is summarized in the accompanying table:

	No. of Cities	Per Cent of Pop. U. S.	Average Population
Total number of cities in which increases were granted. (Population for four cities missing).....	388	54.75	60,366
Granted since Jan. 1, 1918. (Population for four cities missing).....	347	50.82	62,653
Granted prior to Jan. 1, 1918.....	41	3.93	41,015

	No. of Cities	Average Population
Cities in which the fare is increased to 10 cents cash; ticket fare, 7 cents for zone; 5 cents in each two-mile suburban and interurban zone; minimum fare, 10 cents.....	23	44,464
*Cities in which the fare was increased to 8 cents.....	19	75,600
Cities in which the fare is 7 cents and 1 cent charge for each transfer.....	17	91,958
Cities in which the fare was increased to 7 cents (population for two cities missing).....	83	21,815
Cities in which the fare was increased to 6 cents.....	164	67,653

*Three cities, total population 140,808, served also by Boy State Street Railway, included in fourth group.

	No. of Cities	Average Population
*Cities in which the reduced-rate tickets have been abolished (population for two cities missing).....	52	53,839
Cities in which a straight 5-cent fare is being charged with an additional charge for transfers.....	6	100,442
Cities having a 5-cent two-mile zone—next zone 5 cents for 1 1/2 miles, 5 cents for each 1 1/2 miles thereafter—1 cent transfer charge.....	5	83,760
Cities in which the fare was increased to 10 cents.....	6	11,293
Cities having a 5-cent central zone, 2-cent outside zone.....	4	126,743
Cities having a 6-cent central zone, 2-cent outside zone.....	3	57,462
Cities in which a 5-cent fare is being charged, with an additional charge of 5 cents for each zone outside city.....	1	21,561
Cities having a 6-cent central zone, 2 cents outside.....	1	64,720
Cities having a 7-cent inner zone, 5-cent outer zone and 10 cents between.....	1	66,503
Cities having a 5-cent central zone, 7-cent outside zone, overlapping central zone.....	1	586,196
Cities having a 5-cent central zone, 3 cents per mile outside.....	1	535,485
Cities in which a 5-cent fare is being charged, with an additional charge of 1 cent for rides outside of city.....	1	38,272
Cities in which a 10-cent fare is charged for Owl Service day fare 5 cents.....	1	58,716
Cities in which the price of reduced rate tickets were increased from 8 for 25 cents to 6 for 25 cents, cash fare 5 cents.....	1	220,135
Cities in which the fare was increased to 5 cents, a 5-cent charge for rides outside of city limits.....	2	70,528

*One city also included in six-cent group.

Detroit Decision Basis for Toledo Fare Ruling

The Federal Court of Appeals at Cincinnati, Ohio, has handed down an opinion in the appeal of the city of Toledo vs. the Toledo Railways & Light Company affirming the injunction decree of District Federal Judge Killits, of Toledo, restraining the city of Toledo from interfering with the company's operation of its lines in Toledo and the collection of fare at the rate of 5 cents for adults and 1 cent additional for a transfer.

In passing upon the case, the court says the injunction decree appealed does not operate to interfere with the right of the city to pass proper legislation to regulate the fares, nor does it prohibit the city from passing ordinances directing the railway to vacate the streets, remove its rails and prescribe regulations for such removal. Neither does the court prevent the city from fixing fares and provide for exclusion of the company from the use of Toledo streets in the event the rates so fixed are not accepted.

In the opinion handed down, Judge Dennison wrote as follows:

Upon this record, and in this court, the city does not undertake to dispute the claim of the company that any rates or fare less than the proposed new schedule would have been confiscatory, and if enforced against the company, would have been a taking of its property without justification, and would violate its constitutional rights.

By the line of decisions of the Supreme Court, culminating in the Denver Water Company and the Detroit United Railway cases, it now is clearly settled that when the franchise rights of a public service corporation to use the streets, and if expire, the city has the absolute right to order the discontinuance of the service and the removal of property from the street; that the company has a corresponding right to make such discontinuance and removal, but that if neither party exercises this right and if the company, at the city's request, continues to occupy the streets and

to give service, the public regulating power can be exercised only subject to the condition that it must not bring about confiscation.

The decision in the Detroit case, to which reference is made, was reviewed at length in the *ELECTRIC RAILWAY JOURNAL* for Jan. 18, page 149. In the Detroit decision the Supreme Court said that the city could have ordered the tracks from the street after the franchise expired, but that the city can not compel the company to continue business at a loss.

Increase for Seattle Line

The Public Service Commission of the State of Washington has ruled that the Seattle & Rainier Valley Railway may charge 6 cents for a straight ride, 1 cent additional for every transfer issued, and 2 cents for every transfer accepted from other lines.

The city opposed the increase. It was represented at the hearing by Thomas J. L. Kennedy, assistant corporation counsel, and E. E. O'Brien, assistant superintendent of utilities.

The company introduced evidence to show that in 1918 it earned considerably less than 1 per cent on a valuation of \$1,437,271; that wage increases of \$30,000 a year to its employees will be required at once to put them on the same basis as the employees of the Seattle Municipal Railway.

The straight 6-cent fare applies only as far south as Seventy-fifth Street, South. The rate to Benton is 15 cents, or 25 cents for the round trip. Five cents is charged from Seventy-fifth Street to Bryn Mawr. School tickets are increased from 2½ cents to 3 cents. The new rates were scheduled to go into effect on June 1.

New York City Commissioner Sees the Need

Lewis Nixon, making his first public address since his appointment to the Public Service Commission for the First District of New York, told the Brooklyn Chamber of Commerce, on May 28, that he was going to prevent any more receiverships in Greater New York if possible. He is reported to have said:

Neither this state nor this country can afford many more receiverships. If we have many more of them there is no doubt but that it will mean countrywide disaster. I will do everything in my power to prevent any trouble which might lead to disaster. We must face at once a fair discussion and follow that up with a fair adjustment.

The situation has been forced upon us entirely by the war. We are carrying people, now in New York City at a rate of actual cost. I want to meet every one and try to arrive at a fair decision concerning this matter.

There was a day when every one that drew a contract for transit thought that a 5-cent fare was a gold mine, and it was. If we had not had war we would not now face the situation which we are facing, but in the face of things as they are one side must give up something and so must the other side.

Mr. Nixon said that he thought the peak of high cost in operation had been reached in the last quarter of 1918 and that an improvement is now taking place.

Transportation News Notes

Ten-Cent Owl Fare.—The Johnstown (Pa.) Traction Company will raise its fare from 5 cents to 6 cents and start a 10-cent night fare on June 15. It has filed notice of the increase with the Public Service Commission of Pennsylvania.

Publicity for Fare Appeal.—The Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has undertaken a campaign of publicity in connection with its appeal for an increase in its city fares in Terre Haute.

Protest Johnstown Increase.—The special committee of citizens of Johnstown, Pa., organized to protest against the Johnstown Traction Company's increase of fare from 5 cents to 6 cents, will carry their case to the Public Service Commission. The new rate is effective on June 15.

Fare Application Denied.—Representatives of the United Railways & Electric Company, Baltimore, Md., personally appealed to the Public Service Commission to permit the new fare increase—four tickets for 25 cents, or 7 cents for a cash fare—to go into immediate effect. The present fare is 6 cents. The appeal was refused. The action of the commission was unanimous.

Campaign Against Trading in Transfers.—Arrests are being made by detectives in the employ of the Minneapolis (Minn.) Street Railway in an attempt to curb trading in transfers. In several large buildings transfers are left on window ledges where they are overhauled and used illegitimately by other persons. Fines are being assessed by the city judge. This has tended to break up these clearing houses for transfers.

Weekly Bulletin for Atlanta Patrons.—Plans are being worked out for the publication by the Georgia Railway & Power Company, Atlanta, Ga., beginning at an early date, of a weekly four-page bulletin for distribution among its passengers. The bulletin will be distributed among racks in the cars, the passengers being invited to help themselves. According to preliminary estimates, between 50,000 and 100,000 copies weekly will be required.

Service and Fare Matters Still Unsettled.—The Council of Louisville, Ky., has voted against the ordinance permitting the Louisville Railway to curtail service on certain lines, proposed by Mayor Smith in lieu of an increase in fares from 5 to 6 cents. The Mayor declined to consider a request for increased fares and following action of the Council said that having done all

he could, he had "washed his hands of the whole matter." This matter has been referred to at length previously in the *ELECTRIC RAILWAY JOURNAL*.

Number of Zones Increased.—In an effort to prevent further operating deficits, the Milford, Attleboro & Woonsocket Street Railway, Milford, Mass., has, with the consent of the Public Service Commission, reduced its unit fare rate from 7 cents to 5 cents, but has increased the number of fare zones from seven to eleven. Under the old system, the zones averaged approximately 3 miles each; under the new arrangement they will approximate about 2 miles each. The road last year failed by more than \$8,000 to earn operating expenses.

Six Cents in Peoria.—The Public Utilities Commission of Illinois has entered an order allowing the Peoria Railway to charge a 6-cent fare in the city of Peoria and suburbs, effective on June 7, to continue one year. At that time the fare will automatically revert to 5 cents a ride and twelve rides for 50 cents unless otherwise ordered by the commission. Immediately following receipt of the order the company signed an agreement with its employees granting them an increase of 8 cents an hour, dating from May 1, 1919. The City Council had recently gone on record against the increase in fare from 5 cents to 6 cents.

Staggered Hours Abandoned.—Following ineffectual attempts on the part of the commissioners of the District of Columbia as members of the Public Utilities Commission, to persuade the various other government departments to "stagger" the hours of opening, employees of the District government have resumed the old 9 o'clock opening hour. Ever since the influenza epidemic of last fall they have been reporting at 9:30 o'clock and working half an hour later in the afternoon. The District government was the last of the government departments to abandon the "staggered" hours schedule and did so reluctantly.

Jitney Competition Very Serious.—The Public Service Railway, Newark, N. J., has served notice on the Board of Public Utility Commissioners of a plan to abandon the Bay Avenue portion of its Bloomfield line, the change to become effective on June 17. Should the commission object to the proposal, a hearing to test the necessity for the move probably will result. According to the company, the revenue return does not justify the continuation of the service. It is said that nearly all the traffic of the Bay Avenue line has been taken by the jitneys, except during rush hours. The railway proposes an alternative service for those who would be affected by the abandonment. This alternative service provides for change of cars. Court action will be resorted to by the Bloomfield Town Council in an effort to compel the railway to continue the Bay Avenue service if the company withdraws service by June 17.

Personal Mention

Mr. Maher Chosen

Vice-President and Manager of Third Avenue Railway Will Head New York Association

At the annual meeting of the New York Electric Railway Association, held at Lake George on June 7, Edward A. Maher, Jr., vice-president and general manager of the Third Avenue Railway, New York, was elected president. Mr. Maher has been vice-president of the association during the past year, which has been a strenuous one for the railways in the State. During this time Mr. Maher has given a great deal of his time to the association and has helped greatly to advance its interest.

The history of the Maher family has

trial term of the Third Avenue Railway System, but in 1913 the needs of the company in the operating department led to his appointment as assistant general manager. On the retirement of his father as general manager of the system in 1917, Mr. Maher, Jr., succeeded to that position. Through its control of the Union Railway and Yonkers Railroad the Third Avenue Railway operates a large part of the surface electric lines in Bronx Borough and Westchester County besides its extensive system on Manhattan Island.

Mr. Maher was married in 1897 to Miss Frances E. Gilroy, daughter of Thomas F. Gilroy, a former Mayor of New York City.

Sir Albert Stanley Here

Sir Albert Stanley arrived in the United States on June 7, on the *Mauretania*. Sir Albert, who has just been appointed chairman of the London underground undertakings in succession of Lord George Hamilton, outlined a plan for the improved transit of Londoners by subway and omnibus before he sailed from London. According to Sir Albert, the companies, of which he formerly was managing director, are in process of carrying out the following program:

To acquire as quickly as possible a large number of additional railway cars.

To reconstruct the City & South London Railway so as to provide a new route north and south through the city.

To redesign the cars on the tube railways to make loading and unloading more rapid and convenient and to construct and place on the streets a new and improved type of omnibus.

These improvements will cost several million pounds sterling.

Early in 1917 Sir Albert was made president of the Board of Trade in the British Cabinet, one of the most important official posts in the Kingdom, but some time ago he relinquished these duties at his doctor's suggestion. The *Board of Trade Journal* recently stated that there was every hope and expectation that Sir Albert would shortly be fully restored to health and be able to resume his duties as president of the Board of Trade, but it was reported that Sir Albert desired to retire from the House of Commons at the end of the present session.

It is understood that while Sir Albert has come primarily to America in order to recruit his health he will take advantage of his sojourn to transact a considerable amount of business with the Administration at Washington in connection with the interests of the great department of the British Government of which he has been the chief.

Mr. Katte President

Chief Engineer of Electric Traction of New York Central Heads New York Electrical Society

E. B. Katte, chief engineer of electric traction of the New York Central Railroad, has been elected president of the New York Electrical Society. As chief engineer of electric traction, Mr. Katte has for many years been in direct charge of all the railroad's electric traction work. He was previously, in December, 1902, appointed electrical engineer and secretary of the electric traction commission of the New York Central Railroad, and in this capacity under direction of the commission he had immediate charge of the electrical and mechanical engineering corps engaged upon the work of electrification of the various lines of the New York Central in New York City and vicinity, this undertaking including the construction of two 20,000-kw. central power stations, nine substations, bat-



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E. A. MAHER, JR.



E. B. KATTE

been very closely identified with the railway interests of New York for the past twenty-seven years. In 1892, Edward A. Maher, Sr., who had recently retired as Mayor of Albany and then had served a short time as president of the Albany Electric Illuminating Company, was invited to come to New York to become president of the Union Railway. Soon after it was electrified under his administration, and on the consolidation of the railway with the Third Avenue Railroad he became vice-president and general manager and later president of that company.

Edward A. Maher, Jr., his son and the subject of this sketch, was born in Albany in 1873, and after graduation from the Albany High School in 1890 entered the employ of the Edison Electric Light Company of that city. In 1892 he resigned to accept the position of treasurer of the North River Electric Light & Power Company in New York and in the following year was made general manager of the company, but later resigned to take up the practice of law. For a number of years he practiced as attorney in

teries and electric locomotives, car equipment and the third-rail and transmission system.

Mr. Katte was born in St. Louis, Mo., on Oct. 16, 1871, and is the son of the late Col. Walter Katte, a distinguished civil engineer. He entered the Cutler School in New York City in 1881 and eight years later passed the entrance examination for Sibley College, Cornell University. There he took the regulation four-year course in mechanical and electrical engineering, and upon the acceptance of his thesis, which consisted of a commercial test of one of the first interurban electric railroads, he was graduated in June, 1893, with the degree of Mechanical Engineer. He then traveled through Switzerland and Germany, studying electro-hydraulic plants. Returning to Cornell he took up special work in the design of vertical marine type engines and in mechanical and electrical testing. Upon the completion of this course, in 1894, he received the post-graduate degree of Master of Mechanical Engineering.

After a short term of service with H.

R. Worthington, Mr. Katte became assistant engineer in charge of the direction of the superstructure of the Park Avenue viaduct of the New York Central & Hudson River Railroad in New York City.

In 1898 Mr. Katte was appointed mechanical engineer in the engineering department of the company. In addition to much general work for the company his duties as mechanical engineer embraced the design and installation of mechanical and electrical appliances for numerous coaling stations, water supply stations, electric light and power plants for small passenger and freight stations, offices, yards, shops, transfer tables, cranes, drawbridges, etc. His appointment as chief engineer of electric traction dated from November, 1906. In that capacity he has had charge of the design, construction and operation of the electric traction installation of the company in and about the city of New York.

Mr. Katte was vice-president of the Society of Mechanical Engineers in 1913-1914; he is a Fellow of the American Institute of Electrical Engineers and served on the railroad committee of that body; a member of the American Electric Railway Association, serving on the heavy traction committee, committee on standards and the committee on electrolysis; a member of the American Railway Engineering Association, serving as chairman of the committee on electricity; a member of the New York Railroad Club, serving as chairman of the electrical committee of that association; a member of the American Railway Association, serving on its committee on electrical working, and a member of the American Railway Guild.

New Public Service Commissioners in Indiana

Fred Baes Johnson and Glen Van Auken have been appointed by Governor Goodrich as members of the Public Service Commission of Indiana to succeed Edwin Corr and Charles A. Edwards, whose four-year terms expired on May 1, 1919. Both Mr. Johnson and Mr. Van Auken are attorneys and served as officers in the late world war.

Mr. Van Auken was State Senator from Allen and DeKalb Counties in the 1917 and 1919 sessions of the Indiana Legislature, and a short time ago was appointed a member of the State Industrial Board, from which he resigned upon his appointment as Public Service Commissioner.

Mr. Johnson has had a varied career as school teacher, newspaper man, professor of journalism and as an attorney at law.

Both of the new members of the commission are Democrats, but were appointed by the republican state administration under the terms of the act creating the commission which provides that both political parties shall be represented on the board.

Britishers Coming to United States

At the meeting of the City Council of Liverpool, England, on April 2, it was decided that a deputation of members of the Council be appointed to visit American and Canadian cities to study tramways and electric supply, equipment and improvements. At a meeting of the tramways and electric lighting committee, held on April 4, it was decided that the deputation should consist of the following: Alderman Russell Taylor, chairman of the committee; F. C. Wilson, chairman of the subextension electrical committee; W. A. Robinson, leader of the labor party in the Council, and David Jackson.

The deputation will be accompanied by J. A. Brodie, city engineer; Harold Dickinson, city electrical engineer; C. W. Mallins, tramways manager, and A. G. Smith, city lighting engineer, with the committee clerk.

Several members of the committee expressed their intention of accompanying the deputation at their own expense.

It was announced that the deputation would leave for America on May 27.

William H. Murray, formerly connected with the traffic department of the Santa Fe Railroad at San Francisco, has been made traffic manager and auditor of the Modesto & Empire TrACTION Company, operating between Modesto and Empire, Cal., and connecting with the Santa Fe system.

Leslie R. Coffin, manager at Bellingham, Wash., for several years for Stone & Webster who was called by the company to help at the Hog Island shipyard, Philadelphia, more than a year ago, will be located in San Francisco, where he will cover the Coast states in the interest of construction work for Stone & Webster.

John W. Raisch has been appointed a member of the State Board of Railway Commissioners by Governor Norbeck of North Dakota, to fill the vacancy caused by the resignation of P. W. Daugherty. Mr. Raisch is a native of North Dakota, a graduate of the State university, general course as well as the law department, and has been a newspaper man and practicing lawyer in the State for a number of years.

Richard W Meade formerly president of the Fifth Avenue Coach Company, New York, has been elected president of the Detroit Motorbus Company, organized to put a line of motor buses on several streets in Detroit. An initial service with 100 double-deck buses is proposed and the fare is to be 10 cents. Before becoming an officer of the Fifth Avenue Coach Company, Mr. Meade was connected with the Metropolitan Street Railway, New York. N. Y., under President Herbert H. Vreeland.

Edmond S. Gillette, mechanical and electrical engineer of the Aurora, Elgin & Chicago Railroad, Aurora, Ill., for the past six years, has resigned to become

associated with the Lyon-Metallic Company at Montgomery as service engineer. Mr. Gillette served as a member of the power distribution committee of the American Electric Railway Association and chairman of the electrical engineering committee of the Illinois Electric Railways Association. He is a member of the Master Car Builders' Association.

Fred A. Cummings, formerly reporter for the Lynn (Mass.) *Item* and lately special writer on the Boston *Globe*, has selected by the trustees of the Bay State Street Railway, Boston, Mass., to be public relations representative of that system under the public trustees. The duties of this office will be to encourage the most amicable relations between the management and the patrons. All complaints will be investigated, all suggestions heeded and the utmost endeavor will be used by Mr. Cummings to have the railroad serve the best interests of the people who pay the fares, and the people co-operate with the trustees.

Clyde Taylor has resigned as vice-president, director and general counselor of the Kansas City (Mo.) Railways to resume the practice of law. Prior to 1912, Mr. Taylor was engaged in corporation work and was called by the receivers of the Metropolitan Street Railway, as assistant counsellor, handling practically all of the legal phases of the valuation work, and assisting in the preparation of the franchise. He became general counsel for the company in 1916, and during the absence of Col. Philip J. Kealy, acted as president of the company. Under Mr. Taylor, new problems confronting the company were successfully worked out. These included the 6-cent fare and Kansas bridge matters. Upon his retirement, the board of directors of the Kansas City Railways adopted a resolution praising him for his work, saying that "any lawyer should be proud of the record made."

Daniel L. Ryan, recently secretary to Borough President Frank L. Dowling, has been appointed by Transit Construction Commissioner John H. Delaney as deputy transit construction commissioner. In the law separating the functions of the public service commissioner and the transit construction commissioner, provision was made that the latter should have one deputy, at a salary of \$7,500. Mr Ryan is a former newspaper man with wide experience in municipal affairs and has been familiar with rapid transit matters for many years. He is particularly well fitted for his new post as deputy in the work of transit construction. In that he has made a special study of the dual system contracts and followed every stage of their preparation previous to their execution in 1913. Mr Ryan served as secretary to the New York State Commission to the Panama-Pacific Exposition. He is vice-president of the Taxpayers Alliance of the borough of the Bronx.

Manufactures and the Markets

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

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Fibre Conduit Market Opening Up

Power House and Line Developments
Are Light at Present—Prices
All Off Slightly

The market for fibre conduit, in its relation to electric railway work, presents only a fair condition. In the fields where it is generally used for that work—power house building and additions, underground feeder line extensions and ducts for communication and signal wires—there has been little business offered in the past two years, but of late the market has begun to open up.

This resumption of trade is more noticeable in the larger cities of the middle west where recent orders placed show returning activity. The foreign field is also buying fibre conduit, according to recent shipments to Europe, and more orders would be booked to South American countries were the boat bottoms available. However, the export trade is liable to suffer because of the excessive freight charges. Where freight is charged on volume rather than weight this product is greatly handicapped, for these charges have been twice the value of the product.

There has been found a recent easing off in price of about 8 per cent, but this has not been traced to any easier costs of labor or materials. Factory stocks of raw materials are satisfactory and deliveries of the conduit can be made practically immediately. It is expected that by next year the fibre conduit business will be in excellent shape.

Rails Bonds and Wire Higher

Discounts on Former Drop 2½ Points—
Copper at 17½ Cents

Rail bond discounts have dropped from 25 to 22½ cent making a higher net price on bonds of 3½ per cent. While not very great, the advance shows quite clearly the tendency of bonds to follow the price of copper upward. It developed upon inquiry among manufacturers' representatives that there has been no marked improvement in the demand for bonds. Shipment, it is learned, can be made immediately.

Copper quotation now stands at 17.62½ cents, which is 1½ cents above the quotation of two weeks ago. Copper wire base net prices at the mill are recorded at 19½ to 20 cents. Bare wire manufacturers' bases in the last two weeks have advanced about 1 cent and are quoted at 19½ and 20 cents. Weatherproof wire bases have in-

creased 1 to 2 cents and vary from 20 to 22 cents. Rubber-covered wire base has changed only in the respect that one or two manufacturers have increased a cent or two, but the predominating base holds at 21 cents.

Brooklyn Buys Two Hundred Safety Cars

Cars to Be Furnished Complete by
Manufacturer Except for Fare
Boxes and Registers

An order for 200 safety cars was placed with the J. G. Brill Company, Philadelphia, by the Brooklyn Rapid Transit Company this week. As described in the *ELECTRIC RAILWAY JOURNAL* of March 1 of this year, trial operation with safety cars was begun in Brooklyn on Feb. 23. Altogether, twelve cars were placed in this test service. Six of these were furnished by the American Car & Equipment Company of St. Louis, Mo., and six by the J. G. Brill Company. As a result of this trial the Public Service Commission for the First District, New York, granted permission for the purchase of 200 safety cars as described in this paper for May 3.

SPECIFICATIONS REQUIRE FULL EQUIPMENT

After this permission was granted the company sent out inquiries with complete specifications for the cars and equipment to be furnished. With the tenders submitted by the various manufacturers, drawings were required so that the railway company's engineers could form a definite idea as to the car construction and equipment to be furnished. The cars now ordered are to be furnished complete by the manufacturer with all equipment except fare registers and fare boxes which will be furnished by the railway company. The fare registers will be of the company's standard electrically operated type and for this equipment registers now on hand will be used.

The details of construction and equipment have not been definitely decided on as yet other than they will be required to meet the railway company's specifications. These require a practically standard safety car with a few modifications which have appeared advisable as a result of the test operation. The truck construction will be modified somewhat so as to provide not only for a different journal box arrangement but also for easier removal of the journal boxes. The truck frame will be spring suspended. Standard type of friction bearings will be furnished throughout.

Increasing Demand for Veneers for Repairs

May Replace Shaped Iron Boxes and
Covers—Warping Difficulties
Overcome

Traction companies are using more and more for repair work veneer products which can be readily moulded to take any simple curve. This class of material is also coming more into use in new cars. Former difficulties in the manufacture of the cement used in this product have been overcome so that now the material is impervious to heat and moisture.

It is particularly adaptable for use as headlining, for seats and for outside panels both on the front and along the sides of the car, where changes in temperature and moisture conditions would produce warping.

The lightness and strength of the material is appealing to one prominent manufacturer of electric railway equipment to the extent that he is experimenting with it to replace iron boxes and covers. The cost of it also is a feature in this respect as it is less than that of cast iron for these covers. The wood may be impregnated to be made fire resisting or lined with asbestos when used in the proximity of arc-breaking contacts.

One manufacturer of this material was working up to capacity on car work, but is now down to about one-third capacity since the cancellation of war contracts. He is just getting back to commercial business and reports daily orders from traction companies for materials for car repairs. Deliveries are practically immediate.

Steel Pole Market in Better Shape

Orders Are Coming in Increasing
Volume and No Evidences of
Price Changes Seen

A better market for steel poles has arisen, probably because buyers have come to the conclusion that no additional reduction in steel prices is in sight. The last reduction in steel took effect on April 21, and tubular and open-work steel poles were reduced at that time. Prices of poles have been holding steady since then, and the steel market has experienced little change. There has been considerable business done in steel, however, so it hardly seems necessary to reduce prices to stimulate business any further. Besides, there is no evidence that of their own accord steel prices will undergo much reduction for some time to come.

Still there is found no intention of guaranteeing pole prices with the present unsettled steel market.

With the utilities it seems to be a lack of buying power rather than a belief that prices are too high, that keeps them out of the equipment market. Production has been so curtailed that lower prices due to quantity production cannot be reached. However, some utilities have gone ahead with their plans and pole orders have increased. Besides, the number of inquiries has greatly increased and only a short time is anticipated before many of these will be turned into orders. Much of this is for the domestic market, but there is also considerable activity contemplated in Canada, the Southern Republics, Europe and even Africa.

Illinois Steel Company Reorganization

The Illinois Steel Company has announced a reorganization of its general sales department, effective June 1, 1919, pursuant to which there have been created three divisions of the department, the structural and plate division, the bar division, and the rail, billet and pig-iron division; each division to be in charge of an assistant general manager of sales, who will report to the general manager of sales. The following appointments have been made to fill the new positions created: J. B. Arnold, assistant general manager of sales, in charge of the structural and plate division. B. E. Hamilton, assistant general manager of sales, in charge of the bar division. P. W. O'Brien, assistant general manager of sales, in charge of the rail, billet and pig-iron division.

A new department has been formed to be known as the Chicago district sales office, through which will be cleared sales originating in the territory comprising the northern half of Indiana and Illinois, Iowa, Nebraska, southern Wisconsin and the southern end of the Michigan peninsula. J. G. Carruthers, manager of sales of the Illinois Steel Company at Cincinnati, Ohio, has been transferred to the Chicago office and appointed manager of the Chicago district sales office. All of the new appointees have been connected with the Illinois Steel Company for a number of years, and, with the exception of Mr. Carruthers, have been located in the general sales offices in Chicago.

Oil Market Quiet

The market for oils for lubricating and other electric railway purposes has undergone little change this year. Prices are steady with no apparent indication of a rise. In order to protect the traction companies in case of a drop, it is quite general to insert a clause in the contracts to allow them the advantage of this.

There has been found no evidence that railways are seeking different terms in their contracts because of post-war conditions.

Rolling Stock

Quebec Railway, Light & Power Company has asked for prices for the supply of ten double-truck pay-as-you-enter type of cars, 41 ft. long, for its city service.

Quincy (Ill.) Railway is expecting delivery of twenty-five new cars. A second snow sweeper, an electric welder, a trolley guard and other equipment will, according to reports, come with the new cars.

Hydro-Electric Power Commission of Ontario, Canada, has ordered an additional 10-ton electric locomotive similar to the six ordered previously. This will also come from Canadian Car and Foundry Company.

Capital Traction Company, Washington, D. C., announces the placing of an order for twenty additional cars. The contract was given J. G. Brill Company of Philadelphia and delivery will be made in the fall. The cost of this new equipment will be in the neighborhood of \$250,000.

Washington Railway & Electric Company, Washington, D. C., plans placing fifteen new cars in service by fall, according to president William F. Ham. The additional rolling stock will be paid for out of insurance received from the destruction by fire of the Eckington barn. There will be available about \$100,000 for the purchase of new car bodies, which will be equipped with repaired motors and trucks salvaged from the fire. This is the only additional equipment the Washington Railway & Electric Company proposes to acquire at this time, as the relief given through the 2-cent transfer charge, it is stated, will not be sufficient to enable it to finance further purchases of rolling stock.

Recent Incorporations

Sikeston & Southeastern Railway, Sikeston, Mo.—Incorporated to construct a line from Sikeston, Mo., to Hickman, Ky., via East Prairie, 30 miles. The construction of the line includes twelve wooden bridges from 20 ft. to 50 ft. long. The company would like to receive prices on second-hand rails. Incorporators: M. G. Gresham, Citizens' Bank Building, Sikeston, Mo.; T. A. Wilson, E. A. Matthews, L. M. Stallcup and others.

Franchises

Montgomery, Ala.—The Montgomery Light & Traction Company has received a franchise from the City Council to construct an extension on Bell Street to the city limits.

Newport, Ky.—The Andrews Steel Company has asked the City Commissioners of Newport for a franchise to construct an electric railway on Licking Pike from Eleventh and Brighton

Streets to Twelfth Street, west to Lowell and south to the corporation line. The line is to be known as the Licking Valley Railway.

Track and Roadway

Calgary (Alta.) Municipal Railway.—The City Council of Calgary contemplates electric railway extensions estimated to cost in the neighborhood of \$50,000.

San Francisco-Oakland Terminal Railways, Oakland, Cal.—It is reported that an extension will be built by the San Francisco-Oakland Terminal Railways of its Twenty-third Street line in Richmond. It is stated that the company intends to build through to Giant and Hercules this year and to Martinez ultimately.

Pasadena, Cal.—The City Commission of Pasadena will begin at once a preliminary survey of a right-of-way for the construction of a municipal railway to connect Pasadena and Los Angeles. The survey will be made by the engineering department of the city under direction of R. V. Orbison, city engineer.

Iowa Southern Utilities Company, Centerville, Iowa.—The Iowa Southern Utilities Company will ballast 7 miles of interurban track.

New Orleans, La.—A committee representing the cities and towns between New Orleans, La., and Mobile, Ala., inclusive, met recently at Biloxi and awarded a contract to James W. Billingsley, New Orleans, for a preliminary survey for the proposed municipally-owned line between those two cities and along the Gulf Coast. [April 5, '19.]

Fenton, Mich.—W. E. Martin, Flint, is interested in the construction of an electric railway between Flint and Owosso.

Public Service Railway, Newark, N. J.—New track is being laid by the Public Service Railway on Elizabeth Avenue, Elizabeth, N. J., for a distance of about 1 mile.

New Jersey & Pennsylvania Traction Corporation, Trenton, N. J.—The city Commission of Trenton has granted permission to the New Jersey & Pennsylvania Traction Company for double-tracking its line on Calhoun Street as far as the Delaware River.

Long Island Railroad, New York, N. Y.—Plans are being considered by the Long Island Railroad for the complete electrification of its Montauk division to extend to Babylon. The line is electrified at present as far as Lynbrook, the remaining distance to Babylon being about 19 miles.

Capitol Car Line, Bismarck, N. D.—An extension will be built by the Capitol Car Line to connect with the Soo Line and thence to the capitol, forming a loop.

Cincinnati (Ohio) Traction Company.—At a recent conference between city

officials of Cincinnati and Walter Draper, vice-president of the Cincinnati Traction company, a large number of improvements of car tracks of the Cincinnati Traction Company were agreed upon. Chief among these are the double-tracking of Central Avenue from Liberty to Mohawk Bridge, laying of new tracks on Harrison Avenue and the probable elimination of the Mohawk bridge over the canal.

Cobourg, Ont.—It is reported that the construction of an electric railway from Central Ontario Junction in Rawdon township, through Campbellford and Seymour, Percy, Haldimand and Hamilton townships to Cobourg is under consideration. J. A. Humphries, Campbellford, is interested.

Toronto, Ont.—The Ontario Hydro-Electric Commission of Canada has been asked by boards of trade in towns along the north shore of Lake Erie between Bridgeburg and Port Colbourne, Ont., to start immediate construction of the hydro-radial line between these two points, a distance of about 30 miles. Before the outbreak of war the towns along the proposed route voted to guarantee the bonds incident to the construction but the war stopped work on the proposed line. The towns now contend that there should be no delay in starting the line because it is considered an urgent necessity and would give work to returning Canadian soldiers.

Toronto & Eastern Radial Railway, Toronto, Ont.—It is reported that the Toronto & Eastern Radial Railway will be completed in the near future. Track has been laid from the eastern limits of Bowmanville to the western limits of Whitby, a distance of 15 miles. From Whitby to Pickering the railway is ready for track laying. W. E. Oliver, superintendent of electric lines. [May 15, '15.]

Toronto (Ont.) Street Railway.—It is reported that the Toronto Street Railway contemplates the reconstruction of 6,324 miles of track.

Reading Transit & Light Company, Reading, Pa.—The City Council of Reading, Pa., has passed an ordinance amending existing legislation to the extent of permitting the Reading Transit & Light Company to use T-rail where tracks are being renewed on streets that are being re-paved by the city. Substitution of T-rail in place of girder rail heretofore specified will enable the transit company to do a larger amount of new track work with the money that is available for the purpose this year.

Levis (Que.) County Railway.—A report from the Levis County Railway states that it is rebuilding the remaining portion of 12 miles of single track not completed last year.

Montreal, Que.—The harbor commissioners of Montreal have decided to proceed with the electrification of the harbor railway tracks, held up by the war, and plans are now being prepared. This year the electrification will be

pushed as far as possible; in fact it is expected that that part of the system between Victoria pier and Montreal east will be in operation by September.

Dallas, Tex.—Surveys have been begun by the Fred A. Jones Construction Company of Dallas for the proposed interurban line from Dallas to Wichita Falls, 125 miles. Several tentative routes will be surveyed and estimates of cost made for each. Wiley Blair, Dallas, is chairman of the committee of citizens that is promoting this line. The estimated cost of the line is about \$6,000,000. [Mar. 22, '19.]

Dallas (Tex.) Railway.—The Dallas Railway, in requisitions filed and approved by Lynn B. Milam, supervisor of public utilities, has asked permission to spend \$650,000 for the purpose of improving the company's present lines and building extensions. Supervisor Milam says a total of \$525,000 will be spent immediately on the improvements of tracks on Elm Street, McKinney Avenue, and Main Street and for passing curves and the installation of new equipment. The improvements will also include tracks on Preston Street. The extension of car lines, which includes the Seventh Street line in Oak Cliff, the line to Oak Lawn and to the City Hospital and one to Oakland Cemetery, will be held up pending the laying of storm sewers and the opening of necessary streets by the city. An extension to Mount Auburn district, though not officially announced, is contemplated and will be ordered built by the supervisor if the extensions as proposed are delayed.

Dallas (Tex.) Southwestern Traction Company.—A. P. Turner, president of the Dallas Southwestern Traction Company, which proposes to build and operate an interurban line from Dallas to Irving, a distance of about fifteen miles, and thence southwestward through Grand Prairie, Mansfield, Cleburne to Glen Rose, announces that construction work is expected to begin at once on the Dallas-Irving line. About one-half of the grading has been done and ties and rails have been purchased for a large part of the line. [May 4, '18.]

El Paso (Tex.) Traction Company.—An extension will be built by the El Paso Traction Company to serve the El Paso High School.

Wichita Falls, Tex.—The Chamber of Commerce of Wichita Falls has under consideration the proposition of the construction of an interurban railway between Wichita Falls and Burkburnett. The matter was presented to the board of directors by W. L. Somtag, a railroad contractor of Evansville, Ind. The line would obtain its power from the Texas Light & Power Company.

Seattle (Wash.) Municipal Railway.—Extensions, additions and betterments of the Seattle Municipal Railway system were authorized by the City Council recently by the passage of an ordinance enumerating in detail the im-

provements contemplated and authorizing an issue of utility bonds to the amount of \$790,000 to finance the construction program specified.

Ohio Valley Electric Railway, Huntington, W. Va.—It is reported that the Ohio Valley Electric Railway contemplates the construction of a line on Eleventh Avenue from Eighth Street to West Fifth Street.

Power Houses, Shops and Buildings

Iowa Southern Utilities Company, Centerville, Iowa.—The Iowa Southern Utilities Company will reconstruct its power house at Centerville.

Rockford & Interurban Railway, Rockford, Ill.—The Rockford & Interurban Railway contemplates the erection of a new power plant at Belvidere.

Bangor Railway & Electric Company, Bangor, Me.—Improvements are contemplated by the Bangor Railway & Electric Company at both the Ellsworth and Veazie power stations; also the reconstruction and re-insulation of the feed wires between the two stations. At the Ellsworth station a 25,000-kw. generating unit will be installed and at the Veazie station three high-efficiency waterwheels will replace the old wheels now in use.

New England Power Company, Worcester, Mass.—The New England Power Company, which furnishes energy to the Berkshire Street Railway, plans extensions and improvements to its power plant and distributing systems, involving an expenditure of about \$1,000,000 this year. The proposed work will include enlarging the power station at Vernon, Vt., and the installation of water wheels and generators, increasing the generating capacity by 15,000 hp, the erection of additional substations, and also connecting the present system, which covers central and western Massachusetts and a large portion of Connecticut and Rhode Island, with the Metropolitan Board of Boston by erecting a feed line into and from the stations of the Edison Electric Illuminating Company of Boston.

Public Service Corporation, Newark, N. J.—Work will soon be begun by the Public Service Corporation on the erection of an electric transmission line to extend from Bordentown to the Municipal Water Works.

New York Municipal Railway Corporation, Brooklyn, N. Y.—Plans have been prepared by the New York Municipal Railway Corporation for the erection of two new one-story structures at 420-22 Broadway.

Ohio Electric Railway, Lima, Ohio.—The Ohio Electric Railway contemplates improvements to its local plant, involving an expenditure of about \$200,000. The company also plans to build within the next five years, either at Indian Lake or Scotts Crossing, a power plant to cost about \$2,000,000.

Lawton Railway & Lighting Company, Lawton, Okla.—After July 1, the Lawton Railway & Lighting Company will abandon its power plant and secure all its power from the Comanche Light & Power Company. The Comanche company will install additional equipment to take care of the increased business, including a synchronous motor generator with 250 kw. capacity.

Altoona & Logan Valley Electric Railway, Altoona, Pa.—The construction of an addition to its power plant at Tyrone, to cost about \$500,000, is being considered by the Altoona & Logan Valley Electric Railway.

Waynesboro (Pa.) Electric Company.—Preliminary work has been begun by the Waynesboro Electric Company, which is controlled by the Chambersburg, Greencastle & Waynesboro Street Railway, for the construction of a new high-tension power system from the present terminus at Blue Ridge Summit to Greenstone, about 2 miles.

Sneedville, Tenn.—John N. Adams, Chemical Engineer, Charleston, Tenn., will construct a hydro-electric plant on the Clinch River at the Auger in Hancock County, to furnish energy for the operation of an electric railway. The transmission system will extend from Morristown to Moorsburg, Treadway, Sneedville and Kyle Ford. The plant will develop 4,000 hp.

Texas Electric Company, Dallas, Tex.—Construction will be begun immediately on a six-story addition to the east end of the Dallas Interurban Building, to make the entire structure of an even height of eight stories. The addition will cost approximately \$150,000. Plans have been prepared and are now ready for contractors' estimates.

Trade Notes

Ford Mica Company, Inc., is now at 14 Christopher Street, New York City.

Inquiry 29,478.—A Brazilian engineer, who will be in the United States shortly, desires to purchase materials for the construction of an electric railway, and for electric railroad supplies. Consult Bureau of Foreign and Domestic Commerce, Washington, D. C., using number.

Electric Locomotive Exports.—Exports of electric locomotives for March 1918, were \$17,000 while for March 1919, they more than doubled, to \$35,687. For the nine months through March 1918, these exports amounted to \$122,679, and these nearly doubled to \$223,452 for the same length of time through March, 1919.

Bailey Meter Company, Cleveland, Ohio, announces the removal of main office and works to East Forty-sixth Street at Euclid Avenue, Cleveland, Ohio. The Boston office will be maintained to render engineering and sales service in New England and Atlantic Coast States under the management of H. D. Fisher.

Walter Treat Walker has been appointed manager of the Buffalo office of the Western Electric Company. During the war he served as first lieutenant in the Signal Corps, U. S. A., and on his discharge from the service he was appointed manager of the Newark office, in February, 1919. Gregory Brown has been appointed manager of the Newark house to succeed Mr. Walker.

Charles H. Dennis, formerly operating head of the Railway Audit & Inspection Company, has been elected general manager of the Railway & Industrial Protective Association, Inc., of Maryland. Mr. Dennis will maintain operating offices in Philadelphia. V. L. Edmunds, formerly general manager of the Railway & Industrial Protective Association, has been elected vice-president in charge of operating.

J. W. McCabe, who until recently has been district manager of sales for the Chicago Pneumatic Tool Company, at Buffalo, N. Y., has been appointed special representative for the company's foreign trade department, and will depart shortly for an extended trip throughout the Orient, the Philippine Islands and Australia. W. H. White has been appointed acting district manager of sales at Buffalo to take charge of that territory during Mr. McCabe's absence.

John E. Muhlfeld has associated with him several other engineers and has formed the Railway and Industrial Engineers, Inc., with offices at 25 Broad Street, New York City, to act as consulting and advisory engineers among the bankers, railroad and industrial corporations. For the last three and one-half years he has been president of the Pulverized Fuel Equipment Corporation, but he has resigned as president of this corporation to devote his entire time to engineering work. Mr. Muhlfeld retains his interests in and remains a director of the Pulverized Fuel Equipment Corporation.

Charles Gilman, at a recent meeting of the board of directors was elected to a vice-presidency of the Massey Concrete Products Corporation, to have headquarters in New York. Mr. Gilman will be in charge of sales in the Eastern territory of the corporation, comprising New York, Pittsburgh, Southern and Canadian Districts. Part of his early concrete work was on the New York subways in 1904 and 1905. In 1911 he became identified with the concrete products business as assistant to Mr. Quincy, then the vice-president of the American Concrete Pipe & Pipe Company. When this organization was taken over by the C. F. Massey Company in 1912 he became Eastern engineer and in 1913 he became Eastern manager.

E. A. Hitchcock has recently become connected with the Bailey Meter Company of Cleveland, Ohio, as vice-president. He will supervise the training of technical graduates for the company's service and sales departments.

During the past six years he has been connected with the E. W. Clark & Company Management Corporation as advisory, consulting and power sales engineer. Previous to that time he was Professor of Experimental Engineering at Ohio State University.

William Arthur, of the Arthur Power-Saving Recorder Company, New Haven, Conn., addressed the Springfield (Mass.) Rotary Club on May 29 upon the economical use of energy in electric railway operation. The Springfield Street Railway is equipping its cars with the Arthur recorder, and in the course of his remarks Mr. Arthur stated that during the past year the use of this equipment saved 34.01 per cent of the power required at Meriden, Conn., 25.09 per cent at Hartford, Conn., 22.4 per cent at Bridgeport, Conn., and 18.56 per cent at New Haven, despite a traffic increase of 9.17 per cent in the last-named city. Mr. Arthur pointed out that careless operation may cause a needless loss of 100 tons of coal per motorman per year and maintained that by utilizing coasting possibilities to the utmost, a saving of 25 to 30 per cent in power requirements per year can be made without falling behind the schedule of car operation.

New Advertising Literature

Jeffrey Manufacturing Company, Columbus, Ohio: A eleven-page catalog, No. 244, describing standard bucket elevators.

C. H. Wheeler Manufacturing Company, Philadelphia, Pa.: An illustrated booklet of 191 pages to describe its condensers and auxiliaries.

Union Switch & Signal Company, Swissvale, Pa.: Bulletin No. 92, in which Vane Type Alternating Current Relays are described.

Hickey & Schneider, Inc., 441 East Jersey Street, Elizabeth, N. J.: Bulletin No. 13, of forty-eight pages, which covers H. & S. outdoor-type bus supports.

Carbolineum Wood Preserving Company, 518 Prairie Street, Milwaukee, Wis.: Circulars No. 29 and 39, telling about the "Arrow" carbolineum wood preservative.

Hilo Varnish Corporation, Marcy and Flushing Avenue, Brooklyn, N. Y.: Third revised edition of bulletin No. 1 on "Hilo" black enamels and varnishes for air drying and baking.

Sprague Electric Works of the General Electric Company, 527 West Thirty-fourth Street, New York City: Bulletin No. 48713 on the Sprague adjustable-loop system of overhead material handling machinery for terminal sheds.

H. B. Ives Company, New Haven, Conn. A pamphlet descriptive of trolley wheels and bushings. The bushings are self-lubricating, being filled at the factory with a heavy lubricating compound under pressure, so that they can be used throughout their life without lubricating oil.