Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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"Don't Shoot the Organist"

IN PREVIOUS winters the cars of the Berkshire Street Railway have climbed the hills in Massachusetts with a fair degree of regularity. Last winter, however, the line succumbed in the battle with the elements. This was one reason the legislative investigating committee sought on its recent visit to Pittsfield to borrow the ear of C. Q. Richmond, the manager of the line. The committee was critical. Mr. Richmond was courteous. So far as the delivery of car wheels was concerned, Pittsfield was fifty-three days from Pittsburgh. In the matter of other supplies Pittsfield was nine days from Holyoke. In the matter of still other supplies Pittsfield was three weeks from Philadelphia. These were just a few of the winter's difficulties. Mr. Richmond said his road was like a man who had been on a three months' spree trying to sober up in twenty-four hours. It couldn't be done. The manager of the road also likened himself to the organist of a church in Leadville in the wild western days, who was protected by a sign reading, "Don't shoot the organist; he's doing the best he can." Mr. Richmond proved that considering the instrument with which he was working he certainly did the best he could. In short, an organist can't play "The Storm" on the great organ and sustain the fugue movement if the bellows lack air. This was Mr. Richmond's doxology. With it he rested his case. The committee came to criticise. It went away to praise. Mr. Richmond's parallel was unusual. Still, it was efficacious. And therein lies the value of any parallel.

Is the Master Mechanic Becoming More Ingenious?

BY THE nature of his duties the man whose work brings him into the closest contact with the rolling stock has the best opportunity to display ingenuity. During and since the war period he has had to get along without many things that he would like to have in the shop and on the cars. As a result there has been an unusual amount of inventiveness displayed. Much of this is quite commendable, although in commending it a word of caution is in order. The inventive talent should be exercised along the lines of greatest possible productivity and not in duplicating standard devices which can produce the same or better results at lower cost. A case was cited in this paper recently where, to save a trifling sum, a defective part of a signal was replaced with a home-made piece, with a consequent loss of money and time, and damage to the reputation of the signal. However, such cases are the exception, not the rule.

An inspection of any good electric railway shop will convince the visitor that the master mechanic has been using his head lately. Maintenance costs are being kept down by the exercise of brain power. The wonder is that many of the "stunts" that one sees in use were not thought of earlier. The reason is that the incentive to inventiveness was not so great.

In one shop an operation that formerly required about thirty-five or forty man-hours is now being performed in six by the use of very simple apparatus and procedure. This is but an extreme case of what is going on everywhere. In answer to the query: "Is the master mechanic becoming more ingenious?" we say: "He is." We hope to see him get, for himself and his shop, a reasonable share of the increased income that the higher fares are bringing into the railway till.

Another Legislature Fails in a Crisis

RHODE ISLAND'S trolley system may be rejuvenated, but that will hardly be through any help extended by the State of Rhode Island. Most of the electric railways there are operated by the Rhode Island Company, now in the hands of receivers. After much effort a program had been advanced setting down a minimum of legislation regarded as necessary to relieve the company of some of the burdens under which it was staggering. This program had as its keystone an act to create a new company, the United Electric Railways, to succeed the Rhode Island Company, provision being made for participation in the management of the new company by the State and by the city of Providence. This measure was passed.

Of the complementary acts, however, both the bill to authorize the cities and towns to contribute to the cost of service where the receipts of the company are insufficient to pay expenses and the measure to place the jitneys under the control of the Public Service Commission were defeated. On the other hand, a bill was enacted which is intended to relieve the company of some of its paving burdens. But this measure, while it does lift from the company the burden of paying any part of the initial cost where a street is entirely repaved, may have the ultimate effect of imposing greater responsibilities than the company had before with respect to the maintenance of paving.

In an endeavor to effect a reorganization the warring factions of security holders had been won over to consent to a new capitalization far below the present value of the properties. They in turn asked only such relief from the burdens imposed by the State and the cities and towns and such protection from unfair and unregulated competition as would hold out some hope that a return might be realized on the reduced capital. This has apparently been denied. A way out may possibly be found by lopping off some of the outlying lines. In the original plan it had been sought to avoid this. The receivers have not indicated the next steps.

London Says Fare Fixing Implies Responsibility for Results

HAVING recently been treated to the spectacle of a State Public Utilities Commission dolefully deploring the beggared condition of the largest road under its jurisdiction, yet substituting for the company's carefully planned zone-fare system one wholly unproved, untried and unknown, it is as manna from Heaven to read this blunt, common-sense conclusion of the advisory committee on London traffic in its report of March, 1920:

"We do not suggest that the new (proposed) traffic authority should have the power to fix or vary fares, for the obvious reason that these control the methods of operation, and any traffic authority claiming powers to settle the terms on which passengers are to be carried must be prepared to subsidize or, in case of need, to operate."

The advisory committee qualifies this statement only by the proviso that the controlling or regulatory body should have the power to call for the production of all books and the inspection of all methods of operation. But it is crystal clear on the point that the power to fix fares is incompatible with the lack of corresponding responsibility for results. It will not do to say that the British, having had little fare regulation hitherto, aside from the Parliamentary maxima of long ago, will come around to the irresponsible style of regulation that has grown up here. The advisory committee appears to be mightily well informed concerning regulation in the United States and goes so far as to foreshadow the possibility of adapting the Cleveland service-at-cost plan to the far more complex conditions of London. At the same time the common sense of these Britishers has told them that the continuation of good street railway, motor bus and rapid transit service is too important to be trifled with airily by commissions which cannot assume responsibility even if they would. When the state delegates the power of rate making to such bodies it ought to be prepared to make good the mistakes of its agents. If the advisory committee's suggestion is an example of the famed British characteristic of muddling through, we can stand a little muddling of that kind ourselves. Whatever happens in the London case, no one can withhold admiration for the committee's recognition of the fact that subsidization or outright operation by the state are the only livable alternatives to granting the right to charge a fair fare.

In Justice to the Single-Phase Motor

THE alternating-current railway motor has had a commercial career of about fifteen years in this country. The writer confesses to a feeling of skepticism when, in 1905, the announcement was made that the Westinghouse company had entered into a contract with the New Haven Railroad to equip the New York terminal of the latter for single-phase operation. At that time, while the series alternating-current motor was by no means new, the practicability of applying it to such heavy duty was considered by many to be dubious, to say the least.

The designers of the new type of traction motor knew, of course, that they had a difficult problem on their hands, but the advantages of the alternating-current transmission and distribution without intervention of the rotary converter were considered to be a goal well worth striving for and violating precedents to obtain. During the ensuing decade there was much discussion among the experts as to the relative merits of the direct-current and alternating-current systems, with resulting confusion to the lay mind. Now all is serene, and the railway manager who wishes to electrify his lines can have any system that he wants with full assurance that the equipment will produce the expected results.

Of the two types of motor, the alternating-current one is necessarily somewhat more complicated in construction, due to the necessity for providing a compensating winding on the field frame and to the larger number of poles required. It is also heavier for the same reasons. One would naturally expect, then, that the maintenance of the motor would be much more difficult and expensive. As a matter of fact, however, the modern alternating-current motors are not at all difficult to keep in "good shape." A foreman in one shop, where many such motors must be kept up, remarked recently that he sees essentially no great difference in the local shop work from what would be required for direct-current motors. It is a pleasure to record this because it indicates a great accomplishment in a short period of time. If other considerations dictate the advisability of using the single-phase system, fear of excessive maintenance cost need not be a deterrent.

Commissions Must Restore Confidence in Utility Securities

WARNING has been given time and again by electric railway men that the continued inability of the companies generally to pay dividends to those who have invested their surplus capital in the railway properties would prevent them from securing new money for extensions and betterments to keep pace with the needs of the rapidly growing communities served. The accuracy of this prediction is becoming painfully apparent, even though some of the railways are so recovering their earnings as to be able to pay dividends. So much new work was postponed during the war that an immense amount is now urgently needed. This calls for the raising of very large sums of new money, on which, if it could be secured, dividends could probably be paid with the continuing good traffic and the increased fares being enjoyed by many properties.

But electric railway securities are a drug on the market and those of the other utilities are in like condition. The truth and seriousness of this was reflected at the hearing of various Illinois public utilities before the Public Utilities Commission, at which they presented the detailed reasons for their inability to carry out needed improvements ordered by the commission.

What can the commissions do to better the situation? First, they can approve holding extensions of service in abeyance temporarily until the financial conditions can be improved. Second, they can use their good offices in an effort to restore public confidence in public utility securities. For the present security market is purely the result of a loss of confidence. To help restore it may require that the commissions approve rates of fare which will bring a higher rate of return on the outstanding stock. They can also help in new financing by approving higher interest rates for a few years until confidence is restored. But almost no possible interest

rate at present would in itself offset this lost confidence. It seems to us that the utility commissions will best serve their constituents by so regulating the utilities as to permit a rate of return of 10 to 12 per cent. It would not take more than two years of such return to bring the necessary money to the utility field, and since there is nothing of more value to the people than well maintained and operated and fully adequate public utilities—these attributes being the direct outgrowth of healthy earnings—and since the commissions have full power to prevent misappropriation of funds, why not make high earnings possible? Then we can all have a place to invest our savings where the earnings will be attractive and the securities sound and enjoy the good service resulting from the money thus invested meanwhile.

How Do You Buy Advice and Equipment?

IN CYNICAL moments we are tempted to doubt whether the majority of humans in this or any other line of work come to decisions as the result of thought rather than mob impulse. Just now we are thinking of a certain something in the electric railway business—never mind what—that is selling like Salvation Army doughnuts. To have bought this article two or three years ago would have meant that originality and courage are rewarded, because, now that success is demonstrated, neither advancing prices nor tardy deliveries can hold back the stampede.

All of which is introductory to our telling about one railway which does do things with a thoroughness and fairness that can be imitated without a penalty of either advancing prices or tardy deliveries. When this company wants engineering advice on some novel development, for example, the specialist is invited to address "a little group of serious thinkers." These men comprise representatives of every department which could possibly be affected by a change in operating practice. They group themselves with seeming casualness about the visitor and then the ordeal opens, beginning with a bit of sniping here and there, but gradually rising to a bombardment of the most searching questions. So far as the teamwork of a dozen earnestly inquisitive men can go, every advantage and disadvantage of the proposal is foreseen and analyzed.

Practically the same procedure is followed with a manufacturer who offers a money-saving or money-making device. He will find that his good-natured inquisitors have studied possibly all of his advertisements, his catalogs and his installations. He notes that the dominant thought of the assembly is: "Will this help us to give more electric railway service for less expense?" To his joy, he finds that the bogey of competitive prices is not invoked; that the famous saying of Fra Elbertus, "Don't mention pay," has taken a new and pleasing meaning. If he has the article that will bring the biggest return on the railway's investment he will get the business. Price-cutting won't help the inferior article. Another appreciated feature of this company's dealings with manufacturers is a just respect for their time. Appointments made are kept with delightful regularity. There is as little waste motion on one side as on the other.

The thoroughness shown by this management in buying advice or equipment is just as evident in its internal affairs. Whether it is labor relations, the skip-stop, destination signs, information booklets, the building of a timetable, etc., the practices of electric railways the world over are painstakingly ferreted out. Originality in many practices has not been found inconsistent with the adoption of good ideas that were born elsewhere, nor with the discarding of local methods that had outlived their usefulness.

Do You Use Your Engineering Manual?

A RECENT conversation with a railway executive showed us that at least one member of the American Electric Railway Association is convinced of the need for wider use of the standards adopted by the association and for initiative on the part of railway managers in connection therewith. If the interest of this executive was more nearly typical of the attitude of the association members as a whole the engineering standards would make more rapid progress. Thousands of dollars and thousands of man-hours of time have been spent in preparing the association standards, and they have had the approval of the association. The association has endeavored to "sell" the standards to the industry and the editorial columns of this paper have urged their more general use, but all of the good work done in preparing the standards and the efforts made to extend their use fall flat without the active co-operation of the member companies themselves and of the manufacturers.

Every electric railway executive who is responsible for the passage of requisitions for materials should familiarize himself with the association standards and recommended specifications in those items used by his department. When a requisition passes through his hands he should examine it to ascertain whether A. E. R. A. standard material cannot be specified, and if such can be used even with slight inconvenience it should be required. Many will be surprised to find how closely the standards correspond to materials which they are now using and which are being purchased regularly without any thought of the A. E. R. A. specifications.

There is also another feature which is very important, and that is active co-operation from the manufacturer. We believe that there is no other class of publicity which could be quite as effective as for the manufacturers in their advertisements to designate various items as A. E. R. A. standards. Thus, in ordering brake shoes, for instance, the Tuneville Trolley Company would write the Goldbrick Company for 1,000 Goldbrick A. E. R. A. standard brake shoes. If the manufacturers make the standard article and the railways specify them, it stands to reason that they will be used.

On the other hand, the manufacturers will make the articles if the railway companies specify them. Thus, the real problem is to get the articles specified. Is it then necessary for the manufacturers not only to make standard articles upon specification, the duty which naturally falls to them, but also to urge that they be specified? This should not be the case. The Manual is available to all member companies. It is arranged in convenient form and carefully indexed. If there is any inherent fault in the Manual which makes its use formidable, why not discuss this without further delay? Otherwise should it not be in more general use, thus capitalizing the work of the association committees?

Maintenance Practice of the Anglo-Argentine Tramway—Part II

The Several Classes for Inspection and Overhauling of Cars Are Described Together with the Duties of the Men and Types of Work Performed

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TRAMWAY LOOP AT THE STOCK EXCHANGE, BUENOS AIRES

IN A PRECEDING article, published in the ELECTRIC RAILWAY JOURNAL for March 20, 1920, the extent of the Anglo-Argentine Tramway lines was described and an outline was given of the standardization work which had been undertaken. The reorganization of the rolling-stock maintenance forces has been of great assistance in carrying out the standardization program. For this purpose the inspection and overhauling work has been divided into the following classes: nightly inspection, fortnightly inspection, general inspection and overhauling, truck overhauling and special inspection made after rainstorms. The organization necessary to carry on the various classes of work will now be taken up and a general idea will be given as to the work which is carried out in each class.

NIGHTLY INSPECTION

A thorough inspection cannot be made at night, but as more cars are laid up at this time than during the day a slight inspection of the cars is made at this time. Cars with even numbers are inspected one night and those with odd numbers the following one. This inspection comprises the adjustment of loose bolts and nuts, and inspecting brake rigging, lifeguard triggers, sanding mechanism, gongs, bells, lighting circuits, doors, windows and seats. Three workmen under the supervision of the night foreman inspect each car in about twelve to fifteen minutes and cover from thirty-five to forty cars per night. No repairing is done at night. Any car found with a defect is put aside to be repaired the following day by the gang in charge of the supplementary work. A very close watch is kept on the men and very seldom a car "O. K.'d" during the night shows any defect the following day.

An accompanying illustration shows the form used for the report of the night foreman to the chief foreman. Under the heading "Cars left for repairing" he enters the number of all those cars that are found with defects and which should be repaired the following day. Under "Cars detained for the fortnightly inspection" and "Cars detained for the general overhauling" he enters all the cars that are to be withheld from service in the morning for undergoing either one of these inspections. Under "Night inspection news" he gives all of the particulars as to defects found in the inspected cars. This form is examined and signed daily by the rolling-stock inspector.

WORK DONE ON FORTNIGHTLY INSPECTION

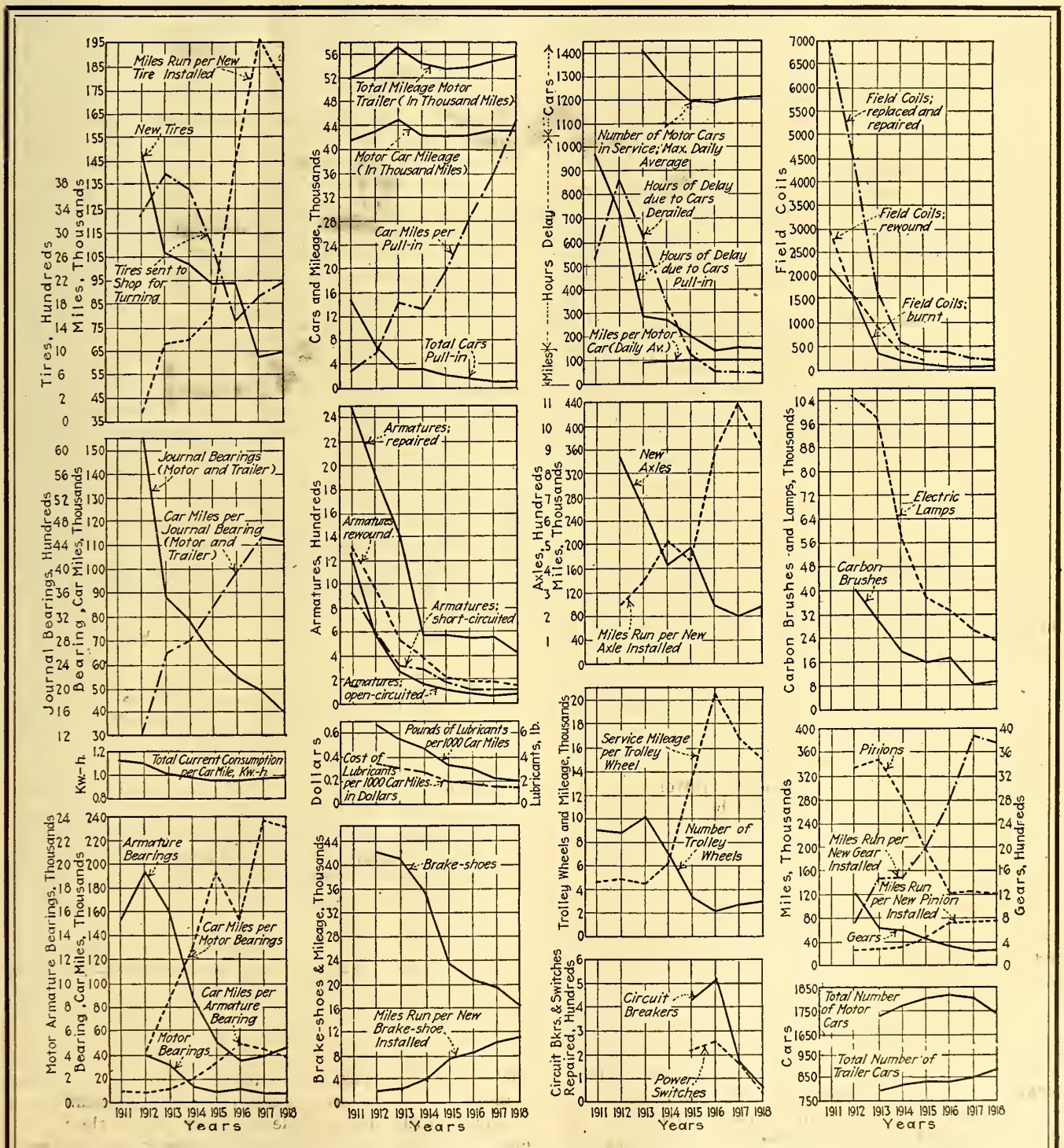
After the cars are placed over the pits a gang of six men, each one a specialist in the maintenance of a certain part of the equipment, begin the inspection. They are directed by the day foreman, who is in charge of this work. The carpenter looks after doors, windows, seats, curtains, glass, bells and gongs. The truck-and-brake man with an assistant inspects the braking mechanism. One applies the brakes while the other follows the movements of the levers, adjusting where necessary and lubricating with grease and oil. Brakeshoes are ad-

justed, or replaced if worn out. The inspection of truck parts consists in tightening bolts and examining the condition of springs, adjusting life guards to the required height from the rails and testing their trigger mechanism, emptying the sand box, removing all obstacles such as large stones therefrom, and making sure that everything operates satisfactorily.

The foreman, assisted by the control man, tests the resistance and insulation of the power circuit on each car. Both controllers are inspected to detect loose fingers or burned segments. The control man cleans the segments and fingers, rubs them slightly with vaseline and puts a few drops of oil in the shaft bearings. He examines and cleans switches, circuit breakers, fuses for power and lighting circuits and electric lamps, and makes replacements when necessary.

The motor man inspects the motors and armatures, cleans commutators, adjusts or replaces carbons and brushholders, verifies the armature air gap for given limits, blows out dust and sees that the case closes well. The dust is blown off the resistors once every month.

The trolley man sees that the trolley swivels properly, gages the trolley wheel and replaces it if worn out or takes it to the bench to have it turned if it is wearing out improperly. He puts a few drops of oil in the trolley wheel and in the trolley base.



GRAPHS SHOWING RESULTS OBTAINED FROM STANDARDIZATION OF WORK AND METHODS

The oil man is responsible for the proper lubrication of motors, gears, axles, etc., and he follows strictly the instructions given.

Wheels are inspected by the foreman once a month. He determines with a special gage the degree of wear and sends them to the lathe if necessary.

All light work of repairing found necessary during this inspection is done by the corresponding maintainers. In case the repairing work is of such a kind that it requires the help of other men, the maintainers are assisted by the gang for supplementary work. This force, as explained, takes care of all work not done periodically and assists the maintenance gangs when required. The average time for inspecting a car is about 1¼ hour. It is impossible in this short time to inspect each car in the smallest detail and, due to their inaccessibility, many parts are left unexamined. This makes it imperative that, at regular intervals, the electrical and mechanical equipment be thoroughly inspected and overhauled, and this is done to every car once every eight months.

The foreman in charge of the fortnightly inspection fills out Form II, putting down the number of the cars inspected, the air gap measurements, insulation and resistance measurements, and once every month the condition of the wheels. This form is examined daily by the inspectors, who can immediately control any abnormal condition.

At the same time that the fortnightly inspection of the motor cars takes place the foreman in charge supervises the fortnightly inspection of the trailers, for which there is a special trailer maintainer, who inspects the mechanical and electrical equipment and electrical circuits. The carpenter who inspects the motor cars takes care of the inspection of glass and woodwork of the trailers.

General Inspection and Overhauling Work

A gang of seven men under the supervision of the chief foreman, assisted by the supplementary work gang, overhauls each car every eight months. This gang is composed of the first mechanic, who assists the chief foreman in conducting the work and takes care of motors, cables and resistances; one electrician and assistant for controllers and apparatus of power and lighting circuits; one man for trolley wheels and poles; three men for the mechanical equipment and to assist in overhauling motors and changing gears, and one carpenter for all woodwork.

The inspection done by this gang is carried out as follows: Trolley bases are cleaned and lubricated, and the springs are adjusted so the pull at the trolley harp at the height of 19½ ft. above the rail level is 15½ lb. The trolley harp is cleaned and the trolley wheels gaged. If they are found to be wearing out of shape, they are taken to the lathe to be turned true or are replaced if found at their limit of wear. Connection leads at trolley stand are cleaned and inspected to see if insulation is in good condition. The canvas that covers the cable, on the roof of the car, is examined and painted or changed if worn out. Switches are cleaned and adjusted so that they will make good contact. The circuit breaker is disconnected and cleaned, pits are removed from contacts and the breakers are sent to the general shops, where they are tested and calibrated to open at the required current limit. Fuses and lightning arresters are examined and cleaned, fuse holders and bases are changed if they are burned, and the lighting circuit is tested and all lamp holders and switches adjusted. The controllers are disconnected and completely overhauled, scraped and painted with voltalac. All worn out fingers and segments are replaced; the shaft, bearings and gears are inspected for wear and lubricated; the magnetic blow-out coil and arc shields are examined and cleaned, and the finger contacts are adjusted to the proper tension, after removing worn-out ones. Cutout switches are examined and cleaned in order that they will make good contact, and all contacts are slightly rubbed with vaseline. The entering cables are well aligned and securely connected.

The resistors are then cleaned, dust is blown off with compressed air, and the connections are inspected to make certain that they are tight. The various steps of resistance are verified with an ohmmeter, in accordance with the table of resistance values given for the different types of motor equipment. Cable hose is inspected and its insulation tested. Small brass bands are put around each cable that leaves the hose, indicating its use. The position of the cable hose in the car frame has been standardized, and advantage is taken of the opportunity to place it in the middle of the frame in those cars that have it running along the sides. The hose is then painted.

The armatures are taken to the bench, commutators are turned, the mica is undercut and the armatures are painted with voltalac and tested. In case of defects, they are sent to the general shop for repairs. The field coils are disconnected, tested with the "field tester," insulated if necessary and painted with voltalac. The armature and motor axle bearing housings are emptied, cleaned, repacked and bearings are replaced if worn out. The motor case is cleaned inside with kerosene and the motor leads and their rubber bushings are inspected for badly chafed insulation. They are kept securely connected and well spaced with a wooden block. Brushholders are cleaned and adjusted to the required height above the commutator and the springs are adjusted to give the proper tension on the carbons. The gear case is cleaned, and the gears and pinions are lubricated and gaged for maximum wear and adjusted if loose.

The braking mechanism is completely taken apart, worn out parts are replaced and worn holes are bushed. The rigging is put together and adjusted so the shoes, when the brakes are loose, will have a gap of 2 to 3 millimeters with the wheel tire, which gap should be maintained after the brakes are set from both platforms. The truck is cleaned and its alignment verified. All bolts and nuts are gone over and tightened, all spring washers found to be badly worn are replaced and springs are examined and adjusted. The life guard and sanding mechanisms are cleaned, tested and adjusted.

Bells and gongs are examined, door mechanisms cleaned and lubricated and gears or chains are replaced if worn out. All windows, curtains and seats are thoroughly inspected. It usually takes about one day to complete the general inspection on each car.

The overhauling of the trailers is carried out at the same time, for which work only two men are needed; a carpenter for all woodwork and glass, and a mechanic for brakes, trucks, etc.

Each motor and trailer has its index cards (Forms III and IV in the accompanying illustrations). The dates

are entered for the general reconstruction, general inspection and overhauling, full paint, varnishing and half-paint, change of axle and motor bearings, of wheels, brakeshoes, trolley wheels, pinions, gears, etc. On the back of the motor card are written the numbers of the motor and armature, the dates when the armatures were removed to be sent to the general shops, dates when they were put in again, reasons for sending, etc.

The lower part of the card is devoted to axle statistics. All other work done to the cars during this inspection, or at other times is entered in a special book, which is examined daily by the inspector. He also examines the cards of the cars that undergo the inspection and overhauling. All the cars that are inspected or overhauled are examined by the inspector and after he "O. K.'s" them they are returned to service.

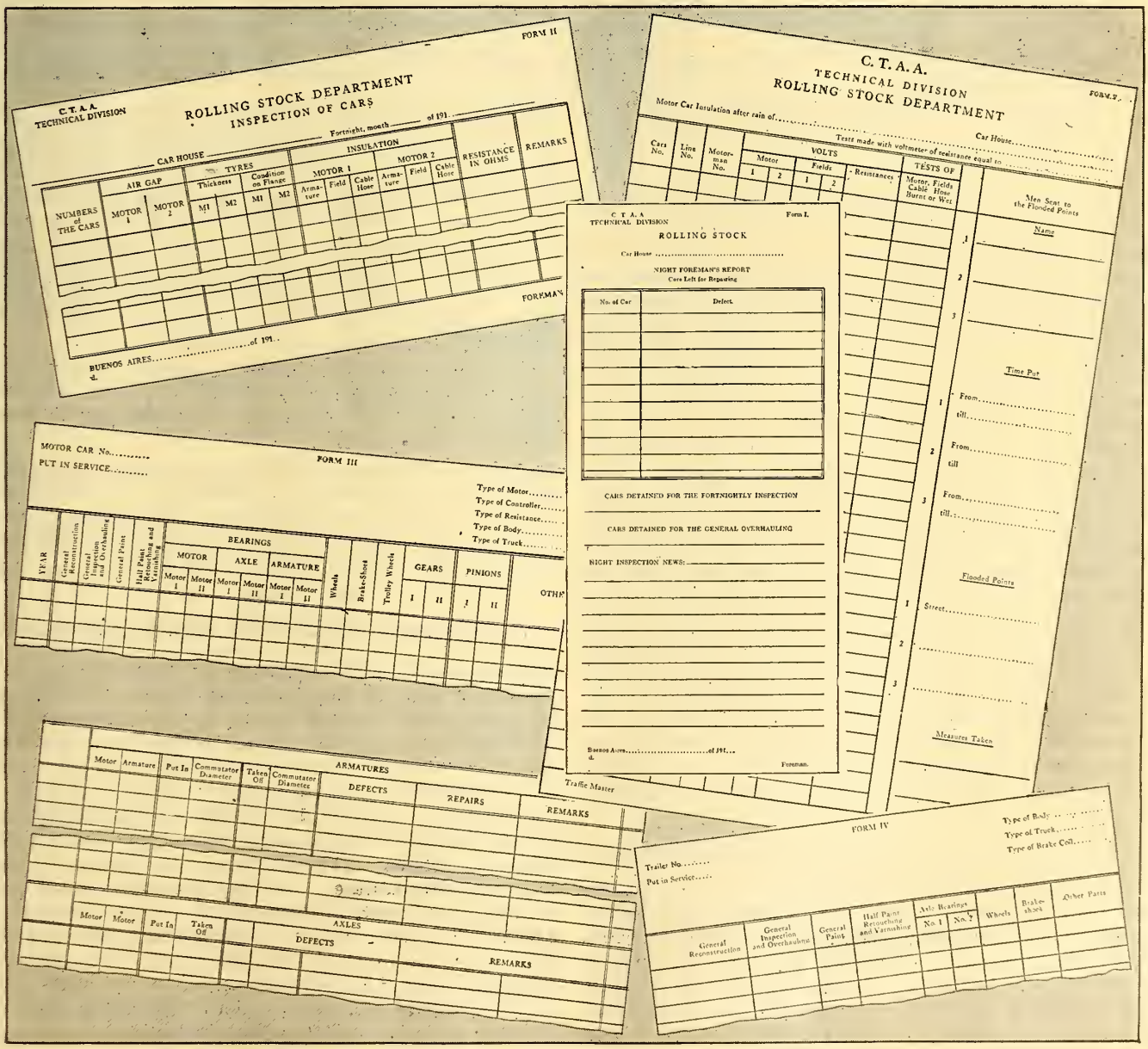
Wheels and Axles Are Changed When Worn Out

During the general inspection just described the body is not raised off the truck, but if it is found during this inspection or the fortnightly one that either the wheels or gears need repairs, then the body is raised, the wheels and axles taken off, the gears replaced or the wheels and axle changed if they are worn out, or have loose tires. Any axle found with a crack of half an inch or more is replaced immediately.

Work such as changing tires or axles is done at the general shops, since at the operating carhouses the necessary tools for any of these operations are not available. The wheels are inspected once a month by the day foreman, assisted by the gang of supplementary works.

Amount of Lubricant Used

The lubrication of the different parts of the car is done at regular intervals as already explained. When a car has undergone the general inspection it is lubricated completely anew. The amount of lubricant used for each part is as follows: the motor axle and armature bearing pockets are filled with 1 lb. each of common oil. The grease box of the motor axle bearings is filled with yellow grease, which is used as reserve lubricant. The oil is fed to the shaft and axle by means of wicks. In the interpole motors the bearing pockets of armature and



FORMS USED FOR REPORTING AND FOLLOWING UP INSPECTIONS

axle bearings are filled with elastic journal packing and to each one is added 2 lb. of common oil. Two ounces of oil is added to each bearing pocket every fifteen days. The journal box is packed with ½ lb. of cotton waste and 2 lb. of common oil. Every two months thereafter enough oil is added just to keep the waste moist. During the general inspection ½ lb. of waste is added to replace that worn out. The gears are lubricated with graphite grease and every two months ½ lb. of grease is added to each gear. Trolley wheels and trolley base bearings are lubricated with grease and oil and the controller shaft bearing with oil every fifteen days.

At the same time the braking mechanism is lubricated with grease and oil. When it is necessary to change the armature or axle bearings, the bearing pockets are emptied and the oil taken to a filter, where, after filtration and decantation, it is used in the journal boxes. Results obtained from the lubrication maintenance standardization has brought the consumption of lubricants down to a very low figure.

The consumption of lubricants per 1,000 car-miles in pounds is as follows:

Common oil (motor and trailer)	0.1605 lb.
Graphite grease	0.0666 lb.
Yellow grease	0.2400 lb.
Motor oil	1.4750 lb.
Elastic journal packing	0.0112 lb.
Total pounds of lubricant per 1,000 car miles	1.9533 lb.

Paint Inspectors Classify Cars

The complete general painting of cars is done in the general shops, and all work of retouching and half-paint (using the bottom coat of paint) is done in the operating carhouses. Sixteen months after the cars have received the general or half-paint they are inspected by the rolling-stock inspectors and classified into three classes: (1) "fair," which are inspected again two months afterward, and so on until they pass to the second or third class; (2) "paint urgently needed," which are immediately withdrawn from service to be painted; (3) "paint soon," which are not withdrawn from service till all cars in class 2 are finished. The complete painting is done only every ten years, when the cars undergo general reconstruction. There are cases when the paint on the cars is in such a bad condition that when designated in class 2 or 3 the bottom coat of paint cannot be used. They are sent then to the general shops for a complete painting. These cases are not very common. Enamel paint has been adopted as standard. This results in a very important reduction of labor, time and material. The standard colors used are reddish brown and light yellow. All ornamental lines have been totally suppressed, the car has a better appearance and the time to repaint a car as well as the labor and material costs is greatly reduced.

Truck Overhauling Done Every Forty Months

Every forty months, at the time of the general inspection, the truck of each car is completely taken apart, scraped and thoroughly inspected; the worn-out parts are replaced and the worn holes bushed. The truck is then painted. At the same time, the cable hose is taken out completely, each cable is thoroughly inspected, and those found in good condition are again used. A new hose is installed.

Another important work carried on by the operating carhouse organizations is the inspection and testing of the insulation for the power circuits of cars after every rainstorm.

The city of Buenos Aires has not a very up-to-date drainage system, and as a result many streets become flooded with even a light shower. This makes it imperative for good maintenance of the rolling-stock that all cars operating through flooded streets be inspected as soon as they are withdrawn from service. When it rains lightly, only ten cars of each line are inspected, and if 50 per cent or more of the cars inspected show a lower insulation than the given limits, then all the cars on that line are inspected. If the cars inspected show that less than 50 per cent have low insulation, then the inspection of the cars on that line is stopped.

When it rains heavily all cars are inspected as soon as they are withdrawn from service. The night foreman, assisted by two men, start the insulation tests, which are continued during the following day by the day foreman until finished.

All cars inspected at night which have a lower insulation than the limits given are put aside and tested again the following morning by the day foreman, and if found defective they are immediately repaired. Practically all repairs consist in changing the field coils, which are taken out, put in the oven and replaced by dry ones.

All cars that show low insulation but which do not pass the limits given are tested again the following day. In this way a close watch is kept of all "suspicious" cars, so as to avoid any trouble that might be caused by an increase of humidity. As soon as it begins to rain the chief mechanic sends a man to each of the points that usually become flooded. This man observes when the water rises to a given level, measured in the car itself, and then advises the motormen not to pass through it. With this care much trouble is avoided.

The observer takes the numbers of all cars and motormen that have passed these flooded points and this list is sent to the traffic department for checking in case those cars show defects.

Form V is filled out after all cars have been inspected, and sent to the rolling-stock department. In this form are given all the insulation tests. The names of the men who were sent to the flooded points, the time put in, the measures taken, etc., are also given.

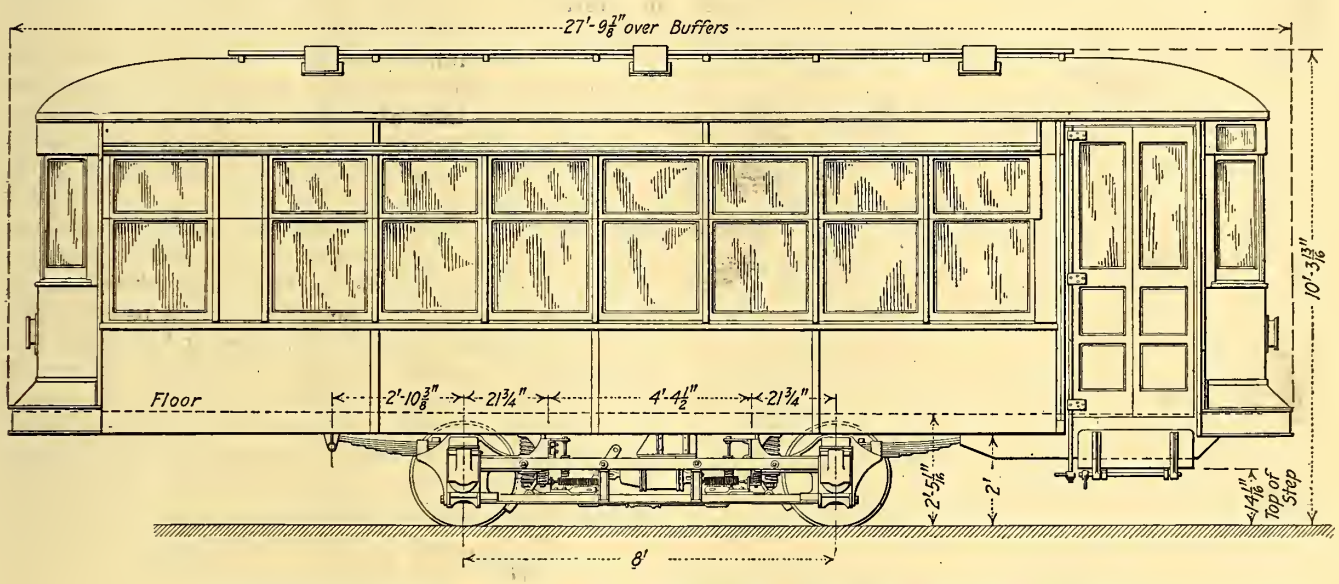
Long Continuous Run for Turbo-Generator

THE 45,000-kw. Westinghouse turbo-generator in the power plant of the Narragansett Electric Lighting Company recently closed down after a continuous run of practically eighty-four and one-half days. This is said to be a world record for the continuous operation of a multiple-element steam turbine of the cross-compound type. During the run more than 50,000,000 kw.-hr. was generated, with a load varying from 6,005 kw. to 41,000 kw. This run was not a test run and it was not premeditated; abnormal weather conditions brought about such a demand for power that the management did not consider it economically advisable to shut down the unit until the conditions were relieved. To some extent the continuous operation was made possible by the 800-gal. self-contained lubricating system, in which oil is pumped through a cooler to the bearings at the rate of 600 gal. per hour.

A New Safety Car Produced En Masse

Particulars Are Furnished of the Osgood-Bradley Safety Car, Which, Though of the Usual Dimensions and with the Customary Operating Equipment, Differs in Certain Features Intended to Secure Greater Strength and Handsomer Appearance

UNTIL the sensational success of the standard safety car the electric railway car builder had no opportunity to produce city rolling stock on a quantity basis. No two orders that came to him were ever exactly alike, even from the same customer. Consequently, there were both extra cost and extra time to be considered by the car builder in doing business on that basis in comparison with turning out a stock product. Today several car builders are actually producing safety cars in quantity and, when necessary, financing the purchase of such cars in the oft-proved assurance that they will pay for themselves in short order.



SIDE ELEVATION OF SAFETY CAR WITH SOME DETAIL OF TRUCK CONSTRUCTION

Despite the great interest in the safety car, no extended description of any of these standardized designs has hitherto been put before the industry. However, through the courtesy of the Osgood-Bradley Car Company, Worcester, Mass., some interesting facts have been made available on the design of this manufacturer. Several hundred cars of this design have already been completed on a quantity-production basis and scores are in actual operation on the lines of the Connecticut Company, and at Elmira, N. Y.; Reading, Pa., and other places.

An examination of the Osgood-Bradley design is of particular interest because the company has adopted certain changes within the standard dimensions and operating equipment that it believes will insure longer life and lesser maintenance as compared with other designs, as will be explained in detail. At the same time the car represents an extended use of American Association standards, as in the adoption of the E-2 axle. It will be understood that the equipment hereinafter mentioned is that which goes on the stock cars, but other devices can be substituted.

In laying out the framing for this car the builder adopted the standpoint that while the car should be light it ought to be strong enough to carry reasonable overloads without distortion and to withstand ordinary service collisions without crumpling. For this reason it may be best designated by the statement that it is of the builder's large-car construction standard, cut down to safety-car size, plus modern refinements which permit the desired strength without going over 16,000 lb. for the double-end and about 15,500 lb. for the single-end design. It is fully intended that this car should be used as strenuously as any other and for as long a life.

A second point was to secure handsome outlines. The illustrations will show better than detail description the success obtained in this direction, especially through the addition of a 6-in. crown to the vestibule. This forestage in the vestibule also permits a good setting of the control equipment and affords a good view to the car operator through the right-hand side window.

Equal-Width Windows, Avoidance of Continuous Post-Carline and Use of Heavier Sheathing

Generally speaking, the construction of this car is steel to steel throughout, no wooden shims being used between any steel members. An essential feature in the design is that all the side windows were made of the same size instead of having the windows nearest the vestibule and the end corner posts made wider than the others. One advantage of this is that all side sash can make use of exactly the same fittings and glass. Much more important is the great longitudinal stiffness of the frame, made possible by the use of wide-plate girder-type body corner posts or piers. The body side posts and carlines consist of 1½-in. x 1½-in. rolled tees.

The posts and carlines are not formed as continuous tees because the builder believes that the difficulty of forming such a combination to secure a satisfactory

degree of symmetry and accuracy is too great to justify its use. For this reason the posts and rolled tee carlines are installed as separate pieces, the side framing and roof framing being assembled separately on jigs to insure absolute squareness and perfect interchangeability. The vestibule carlines are of ash, steamed and bent to shape.

The side sheathing consists of 3/32-in. in preference to 1/16-in. steel, which has generally been used in the past. Strictly speaking, this sheathing is not just a covering, but is the web plate of a vertical girder which is riveted together to form the main carrying member on each side of the car. The same 3/32-in. stock is used for the letter panels over the side windows and for the wide end post coverings in place of the customary No. 20 gage steel. The side sheathing plates are put on in sections, covering two windows with the joints, which come at the posts. These are covered with a batten and splice plate thoroughly riveted together. The belt rails consist of 1¾ in. x ¼ in. steel bars, the window sills of 3/32-in. plates and the dashers of 1/16-in. plates. Wood is used for the vestibule posts, plates, window sills and end pieces.

STANDARD DIMENSIONS OF OSGOOD-BRADLEY SAFETY CAR AND TRUCK FOR DOUBLE-END OPERATION

Carbody		
Length over all	27 ft.	9⅞ in.
Length over dashers	26 ft.	8 in.
Width over side sills	17 ft.	9½ in.
Width over belt rails	7 ft.	8 in.
Width over eaves	8 ft.	8⅞ in.
Width of aisle	7 ft.	9 3/16 in.
Height from rail to bottom of side sills	1 ft.	10 in.
Height from rail to bottom of truck sills	2 ft.	
Height from rail to top of steps	2 ft.	1¼ in.
Height from rail to top of floor	1 ft.	2 in.
Height from rail to top of roof	2 ft.	5 1/16 in.
Height from rail to top of trolley board	10 ft.	3 1/16 in.
Seating capacity	32	
Truck		
Wheelbase	8 ft.	
Spring base	13 ft.	8⅜ in.
Center to center of journals	5 ft.	9½ in.
Width over all	6 ft.	11½ in.
Track gage	4 ft.	8½ in.
Diameter of wheels	26 in.	
Size of journals	3¼ in	x 6 in.
Diameter of axle at wheel fit	4 7/16 in.	
Diameter of axle at gear fit	4½ in.	
Diameter of axle at motor bearings	4 in.	
Capacity	25,000 lb.	

EXTRA STRONG BUFFER CONSTRUCTION TO WITHSTAND SERVICE COLLISIONS

The side sills consist of 3-in. x 3-in. x ¼-in. rolled angles. To these are fastened, by means of angles and gusset plates, the 3-in., 5.5-lb. I-beams which serve both as cross framing and truck sills. The floor supports are 3-in., 4-lb. channels at the body corner posts and 3-in., 5.5-lb. I-beams at the center, extending from side sill to side sill.

The ends of this car have received particular attention to assure a construction which will not crumple up under severe service. The buffer member is a 6-in. channel with flanges extending outward, reinforced with a ⅜-in. anti-telescoping plate about 18 in. deep and 1½-in. x 1½-in. x 3/16-in. angles, all riveted together and to the usual 3-in., 4-lb. diagonal channel platform center sills and to 6-in., 8-lb. channel side sills. Thus is provided a structure of sufficient strength to withstand ordinary service impacts without distortion and of a design capable of transmitting such shocks directly to the main framing. The diagonal members are not called into play, serving merely to keep the car in square. It is obvious, in view of the frequency of minor collisions, that this reinforced construction will save many an hour in the shop that could be better devoted to the manufacture of revenue miles.

After being built up on a jig the roof is secured to the side frames with riveted connection plates. The ⅛-in. body end plate is about 18 in. deep and is riveted to the side frames at the body corner posts, giving great lateral stiffness and so assisting materially in preventing the weaving of the superstructure. While the roof covering is of the customary tongued and grooved whitewood, covered with No. 8 duck, the boards are fully 7/16 in. thick, to insure that a platform or maintenance man who happens to step from the body-length trolley board will not crash through the roof.

As usually furnished, this car has no interior headlining, the carlines and lower side of the roof boards being exposed. The standard interior finish is in birch, while all sash and doors are cherry.

Up to about 11 in. along the side of the car the side sheathing is insulated by a wooden heater panel or truss plank ¾ in. thick. From the top of this truss plank to the window sill the side sheathing is insulated by a steel plate so installed as to provide an air space between this steel wainscot and the side sheathing. This air space gives sufficient insulation for ordinary variations in temperature, especially as the exposed steel is a small proportion of the inner surface of the car and is located in such relation to the seats that it does not come in contact with the bodies of the passengers to any such degree as the glass of the sash, which, of course, are far greater conductors of cold. Nevertheless, where extreme climatic conditions must be met the wainscot and headlining may be of Agasote, Nevasplit or similar material, while storm sash may also be added without interfering with the car design in any way. The vestibule wainscot is also of steel plate, with pockets for the drop sash and with openings at the bottom of each pocket between the wainscot and the floor to permit cleaning.

CURTAINLESS WINDOWS; VESTIBULE AND DOOR FEATURES

As previously noted, all side sash are of uniform width. There are seven windows on each side and one window on the left-hand side of each vestibule. In all side windows the top sash is stationary, while the lower sash is arranged to raise 25 in. in the clear. Although brackets and pockets are provided for curtain rollers and guides, curtains and fixtures of any desired type will be supplied only as special equipment. The builder believes that for the short-line service in built-up territory, for which safety cars are most commonly used, there is no more need for curtains than in a bus and that their omission will tend to reduce maintenance costs. The public does not complain about their absence from buses and is not likely to miss them in districts where there are plenty of shadows from buildings or trees. In any event, the saving in curtain and fixture cost has been used to strengthen the construction so as to reduce upkeep costs in still other directions.

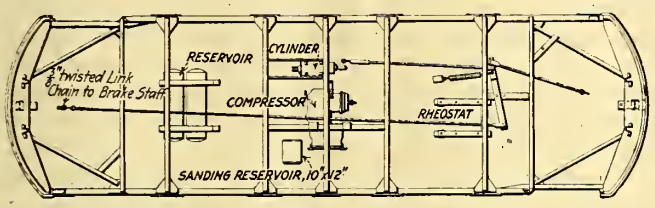
The standard side window guards are ¼-in. pipe spaced 2½-in. centers and six per window. Hinged guards are optional and extra.

The vestibule platforms are flush with the body floors. The vestibules are of the usual fully inclosed type with two-part doors arranged to fold outwardly. These doors

are hung on a steel shaft with ball bearings, and the hinges which join the doors are also of ball-bearing type. Normal operation, of course, is by means of pneumatic door and step control, but a flush handle permits hand closing when necessary. The inter-operating step has a 3-in. flush-inserted Mason carborundum safety tread.

Both the Motorman and All the Seated Passengers Face Forward

Each car is furnished with sixteen reversible, light-weight double cross seats and one double folding seat



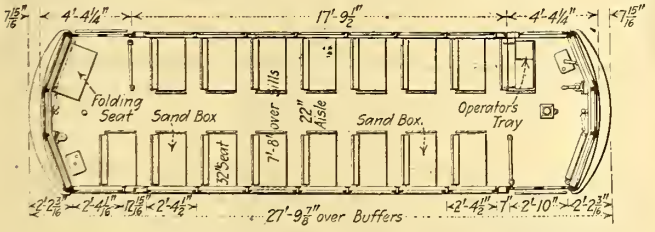
GENERAL PLAN OF UNDERFRAME WITH LOCATION OF PRINCIPAL APPARATUS ATTACHED THERETO

per vestibule of the manufacturer's make. The cross seats have slat cushions and backs. The cushions are non-tilting and easily removable. They are made of birch, but are finished in imitation mahogany. The seat backs have malleable iron corner grab handles finished in aluminum.

The arrangement for the car operator is of particular interest. For his convenience in operating the car and in handling tickets, punch and other accessories the standard cross-seat cushion nearest the controller and air brake is overlaid with a patented combination seat and tray (the tray on the inner side, as illustrated). When the back is reversed this combination swings under the cushion to which it is attached and thus leaves the cushion itself available for passenger use exactly like the other cross-seat cushions. In this way the use of a motorman's stool is obviated. Furthermore, thirty-two forward-facing seats are always available to passengers instead of having the users of the motorman's rear seat and the front vestibule seat ride backward.

A Truck Made for Hard Service and Easy Riding

Examination of the design of the truck will show that while its design differs materially from other single trucks for safety cars, the parts in themselves

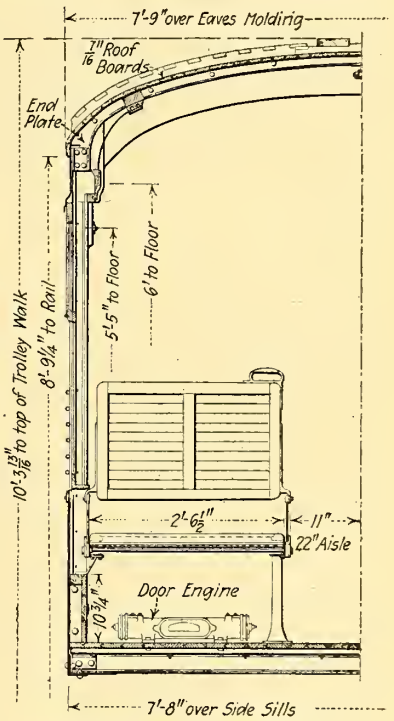


PLAN GIVING PRINCIPAL HORIZONTAL DIMENSIONS

are all standard. The side frame is of the built-up type and a total depth of some 12 in. is secured in this bar-type construction to obtain sufficient increase in strength for the carriage of loads up to a total capacity of 25,000 lb. without deflection or fracture. The truck frame throughout is made up of commercial bars, shapes and steel castings. The frame is tied together and braced transversely by channels at the top, secured to the top members of the frame by combination steel gusset castings. At all essential points the truck parts are fitted with turned bolts drive-fitted in reamed holes. The pedestals are of cast steel with replaceable wearing pieces at the journal-box guides. The journal boxes are of Symington A. E. R. A. standard type for 3¼-in. x 6-in. journals, with top-hung spring lids and fitted with lead-lined journal bearings. The pedestals, however, will take anti-friction ball or roller bearings should the purchaser desire them. Either chilled steel or forged steel wheels of 26-in. diameter may be used in connection with the A. E. R. A. standard E-2 axle. This axle, as noted, is provided with 3¼-in. x 6-in. journals and a 4-in. motor bearing.

Wheels and axles can be removed readily without dismantling the truck. The brakeheads are also made for A. E. R. A. standard brakeshoes. The brake-hangers are of the link type, with compression springs on the pins to eliminate rattle.

It may be surmised that much thought was given to develop a spring suspension which would give the least possible teetering or oscillation. The spring system on which the body is carried includes a quarter elliptic spring at each end or corner of the truck and a set of springs on each side of the truck adjacent to the pedestal. From the reports already forwarded by users, this truck is doing all that was expected in the way of easy riding. Examination of this truck in its entirety, even after the installation of the motive and braking apparatus, indicates that the designers realized the part that accessibility plays in encouraging shopmen to make inspections regularly. The regular motor equipment of this car consists of either Westinghouse or General Electric motors, the former being the No. 506 ball-bearing or No. 508 sleeve-bearing type and the latter the corresponding GE-258 or GE-264 type, as desired. The usual controller is the K-63B. The trolley poles are installed to interlock with the control circuit, whereby the operator, when changing ends, must pull the front pole down and secure it under the hook before it is possible for him to start the car again. This protection eliminates pole, overhead and roof damage due to the operator's forgetfulness.



HALF VERTICAL SECTION, TO SHOW GENERAL MAKE-UP OF BODY

The safety equipment is of the standard type supplied by the Safety Car Devices Company with 8-in. x 8-in. air-brake cylinder and either General Electric CP-25 or CP-27 compressor or Westinghouse DH-10 or DH-16 compressor. About 50 ft. of 1-in. pipe is furnished for radiation. As much of the piping as practicable is car-

ried inside the car alongside the truss-plank or heater panels. For extremely cold climates the piping outside the car can be provided with covering as protection against freezing, but such insulation is not considered necessary for ordinary conditions. In all cases every Safety Devices equipment valve is located inside the car as a protection against freezing, and the pneumatic door engine at each end is placed directly under the motorman's seat, where it is open to both inspection and repair without removing the seat.

The sandboxes, located two at each end of the car under the seats, are arranged with Osgood-Bradley pneumatic traps. These traps are designed to prevent the entrance of water from any source, whether from wheelwash, from snow melted off of a passenger's feet or from car washing. Each trap is fitted with a pipe leading directly to the rail without bends or offsets.

The brake rigging is extremely simple. The brake cylinder is mounted on the car body and is connected to the truck live levers without the intervention of intermediate levers, links and clevices. The only brake lever attached to the car body is that used with the builder's ratchet brake handle of drop type. From this handbrake lever direct connection is made to the handbrake rigging and to the cylinder *via* rods, simplifying the under-car equipment by avoiding the use of sheaves and cables. All holes in the truck levers, brake levers, hangers, etc., are furnished with hardened steel bushings.

WIRING, LIGHTING, HEATING AND OTHER DETAILS

Trolley cables are usually carried in Duraduct flexible conduit, cleated and bolted in place, while the wires inside the car for heaters and lights are in grooved wooden moldings. Metal conduit normally is installed only between the circuit breaker and the controller.

The lighting system comprises three circuits of five 23-watt Mazda lamps, placed as follows: Four on each side of the car body in the upper advertising standard (11-in.) card moldings; two in each vestibule at the side doors to illuminate the steps when the doors are open, but provided with shades to protect the motorman against glare; one in each Hunter destination sign (twenty-five destinations in 4-in. letters), and one in each Crouse-Hinds Type Z headlight of plain glass and enameled reflector type.

The car operator's protection against interior illumination is afforded by a denim curtain hung by rings from a curved rod and usually made to inclose about half of the vestibule. When not in use this curtain is drawn into a side pocket located behind the operator. This arrangement is similar to that in effective use on many city cars for years.

Marker or route lights are not regularly installed. When wanted they are placed over the center vestibule window and provided with 4-in. semaphore lenses with colored glass slides interposed to get desired color combinations.

While the builder is prepared to furnish any kind of heaters desired, that is, electric, stove or forced draft, the standard arrangement embodies the use of ten double-coil 800-watt cross-seat heaters with the coils arranged for three points of heat, as the company believes that the greater effectiveness over truss-plank heaters justifies the additional cost. Thermostats are optional with the purchaser; also extra heaters, as for the vestibules.

Either Consolidated or Faraday buzzers are supplied. These are placed one push-button per side post and one per vestibule at a height which calls for rising from the seat to permit operation.

Ventilation is furnished through six Osgood-Bradley patented exhaust ventilators with adjustable grills or registers set in the ceiling and operated from the aisle of the car. The ventilators are located three on each side of the car.

Registration of fares on standard registers is provided for ordinarily by means of the standard square shaft extending the full length of the car along the center line and operated by cord pull. Should the purchaser so desire, he can arrange for pedal mechanism, pneumatic operation or electric push-button control. The pedal mechanism is not favored because of its greater complexity and the fact that its under-platform location subjects it to neglect, dirt and rust. Foot gongs are of the car builder's make. The trolley catchers are of Keystone or Ohio Brass Company's make, and that pioneer safety device, the life-guard, is either H-B or Osgood-Bradley.

Such items as straps, registers, fare boxes, scrapers, track-switch bars and brackets are left completely to the discretion of the customer.

Careless Auto Drivers and High-Priced Junk

THE accompanying illustrations are reproductions of current bulletins being issued by the National Safety Council. The circular letter which the council sends out with this bulletin states that the rapidly increasing number of automobiles presents one of the most serious problems of the safety departments of electric railway companies today. In 1910 there were 400,000 automobiles in the United States; in 1917, 3,000,000, and in 1919, 7,000,000. And now it is predicted by the manufacturers that 2,500,000 machines

TWO TIMELY BULLETINS FROM THE NATIONAL SAFETY COUNCIL OFFICE

will be manufactured and sold during the current year. Thus it behooves motormen to be increasingly on guard against carelessness of automobile drivers.

The other bulletin depicts the common tendency of human nature to magnify the value of property after it has been damaged, as the electric railway claim agent well knows. Accompanying the bulletin a memorandum from the council says: "Every motorman has it in his power to prevent accidents that lead to at least 75 per cent of the damage claims that come into the offices of electric railway companies. What is more important, he is responsible for the safety of the passengers of his car, and to some extent for the safety of pedestrians and passengers in automobiles."

Why Do Mechanical Rail Joints Become Loose?

Frictional Losses That Develop Between Visits of the Track Walker Should Be Taken Up by the Nut Lock — Specifications Insure a Product Best Adapted for the Service

BY HOWARD H. GEORGE
Assistant Engineer Public Service Railway of New Jersey

ONE of the causes of mechanical joints is breakage of the nut lock or, as it is sometimes called, the lock washer. Another is the failure of the nut lock to develop sufficient reaction to prevent turning of the nut or, as will be later brought out, its failure to compensate for losses in tightness developed by bolts in service. The latter type of failure is not so pronounced when the nut locks are first installed, but there ultimately develops such a decrease in the initial tension as to render the nut lock ineffective. Breakages can generally be traced to either flaws in the metal or to too great brittleness in the metal, caused by improper heat treatment at the time of hardening and tempering. This is also the cause of failure to develop or to retain the full amount of reaction.

The nut lock itself is very small and for that reason, perhaps, track men have not given it the consideration it deserves. Its value, however, if a satisfactory nut lock can be obtained, is large. Comparatively few bolts become loose due to turning of the nuts. Observations in a number of cases have proved conclusively that in most instances looseness occurs either because of the wear of the contact surfaces or on account of actual stretching of the bolts. It should therefore be the aim to secure a nut lock that will compensate as far as possible for this.

The process of manufacture of the nut locks must be as scientifically accurate as possible in order that the steel may assume its proper molecular structure in annealing, and in order to secure the desired degree of hardness and uniformity of temper in the heat treatments. Comparatively slight variations in the degree of heat to which they are subjected in the process of annealing before the stock is shaped into nut locks or of the subsequent heat treatment may be sufficient to render the entire lot defective.

In the manufacture of nut locks the stock is first placed in annealing ovens, where it is brought up to a specified uniform temperature and is kept at such temperature a certain time. It is then removed and permitted to cool very gradually. It is next wound into spiral coils and each individual helix is cut away by passing the coil through a special machine. The nut lock is now formed and is ready for the hardening process. In the latter it is again heated in special revolving drums, the movement of which is so regulated that it requires a certain definite time for a given number of nut locks of a given size to pass through it. The amounts of heat to which all are subjected are therefore uniform. Upon the completion of their passage through the heat chamber they are dropped into a circulating oil quenching bath, and here again the control of the temperature of the oil itself is a very important item in the process.

The next step is the tempering process. This is generally done by again heating them in air until a certain designated color test indicates to the operator that the proper temperature has been reached, when they are removed from the oven and cooled. By this method the determination of the extent of the heat treatment is entirely a matter of judgment on the part of the operator. There has recently been perfected, however, a process for tempering in an oil bath, where the control of the temperature and duration of treatment at such temperature in each bath is absolute and where the human element is entirely eliminated, thus practically assuring uniformity of temper in the finished product. The advantages of this over the first-named process are so many that it is probably only a question of a comparatively short time when all manufacturers of springs of any kind will be forced to adopt it. The above outline of the processes through which the steel goes before it becomes a nut lock should aid the engineer in understanding the needs of some of the requirements in his specifications, and emphasize to him the fact that no other article used in track construction requires any greater refinements or more scientific accuracy in its manufacture than the nut lock.

Why do mechanical joints become loose? To learn what takes place we must study the result and try to analyze what happens. There are many different types of plate joints now in use, but the theory is practically the same in all cases, the principle involved in all being that two wedge-shaped plates are forced against the head and base of the rail by bolts, their function being to hold the ends of the rail together. H. B. Nichols, then chief engineer of the Philadelphia Rapid Transit Company, very clearly explained the action of this type of joint in actual use in a paper read before the American Street Railway Association in 1905, and his statements are as true today as then. Outlined as briefly as possible, his explanation was that the solidity and permanence of the joint depend upon the thorough, continuous and tight contact of the two plates against the rails. In any form of rolled steel, however, the sections are never uniform and, consequently, in the case of rails, the two ends are never of exactly the same section, variations of as much as $\frac{1}{16}$ in. sometimes occurring. This is also true of the plates. But even if it is assumed that the sections are exactly the same and that the plates "fish" perfectly, rolled-steel surfaces are not perfectly smooth, but consist of very small elevations and depressions, and consequently, instead of having a continuous contact between the rails and the plates, only an intermittent or point contact is obtained. Under car loading only, the plates have to resist only vertical and lateral movements, but in addition to these movements there is also a bodily or longitudinal movement of the rail itself, due largely

to temperature changes. There is also the wave motion in the rail as the wheel loads pass over it. All these motions act as does a file on the small irregularities of the surfaces in contact. While this movement is only ¼ to ⅜ in., even in severe changes of temperature, yet the point contacts are so small as compared with the extent of rail movement that the action is the same as that of a file, and the result is that no matter how tightly the plates may have been adjusted originally, they get loose very quickly and the ends of the rails soon begin to hammer under the wheel loads. If the joints are put together in the best possible manner with the material in most common use, and the ties are properly tamped and kept tamped, and the general surface of the track is maintained in good shape and the bolts are tightened at intervals (all of which represents the best practice in railroad maintenance), it will be found that when the man with the wrench makes his occasional or periodical visits the bolts at the ends of the splice bars are often found to be tight, while the next or intermediate bolts are somewhat loose and the bolts at the center of the splice, or at the ends of the rails, are much looser.

To follow up the investigation a little further: In my previous article on the subject of bolts, it was shown to have been proved that ordinary steel track bolts may easily be drawn up so tightly when originally installed as to load them beyond their elastic limit. But whatever may be the cause, as soon as the slightest looseness develops, the rail ends do vibrate vertically between the splice bars. This vertical movement, if continued, causes deformation of the splice bars and cupping of the receiving rail end, resulting in both the joints and rail becoming unfit for main line service long before the rest of the rail has worn perceptibly. It is a fact that splice bars do wear hollow at their centers and that the fishing spaces on each side of the rail grow wider at the ends due to play in loose joints, and once worn, they can never be satisfactorily tightened so as to leave a smooth riding surface.

So much for the causes, but how are we to remedy the trouble? It is my belief that these frictional losses should be taken up by the nut lock, at least such losses as may occur between visits of the track walker. To accomplish this, it is necessary to develop some type of nut lock that will be capable of developing and indefinitely retaining a reaction approximately equal to the elastic limit of the bolt, and that will consequently be capable of taking up such constantly occurring but almost imperceptible losses as they occur and will thus hold the plates firmly in place. Failure of joint bars has been largely reduced by the design of bars whose neutral axis corresponds with the neutral axis of the rail. Practical elimination of bolt failure be-

Nut Locks

1. Material:

The steel from which the nut locks are made must be of open-hearth steel, or other approved process, and shall conform to the following chemical analysis:

Phosphorus—not over 0.05 per cent.
Sulphur—not over 0.05 per cent.

2. Physical Properties and Tests:

After the finished nut lock has been subjected to pressure sufficient to compress it flat for a period of one hour, its reaction shall not be less than two-thirds (⅔) its height or thickness of section, providing such thickness is less than the width of section. If the section is square, the reaction must not be less than one-half (½) its thickness. If the height of thickness of section is more than its width, the reaction shall not be less than the width of the section. These specifications apply to nut locks having internal diameters of 13/16 in., 15/16 in. and 1 1/16 in. as used with bolts having diameters of ¾ in., ⅞ in. and 1 in. respectively.

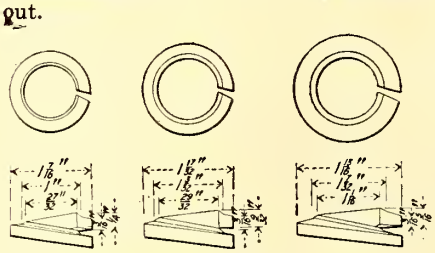
With one end of the finished nut lock secured in a vise and the opposite end twisted to forty-five degrees there must be no sign of fracture. When further twisted until broken, the fracture must show a good quality of steel.

A sufficient number of tests will be made to satisfy the railway company's inspector that the material meets the specifications in every respect, and he shall have the privilege of selecting the specimens to be tested.

3. Workmanship and Finish:

The dimensions and form of the nut lock shall conform to the drawings submitted to the manufacturer.

The nut locks shall be clean and without burrs or rough edges. The coil and cross-section shall be uniform throughout.



DIMENSIONS OF NUT LOCKS

The manufacturer is required to guarantee:

"A" That the steel was thoroughly annealed and permitted to assume its proper molecular structure before being made into nut locks.

"B" That the subsequent heat treatment was scientifically accurate according to the best methods known, to secure uniformity of temper and the highest efficiency obtainable.

4. Inspection:

When required, the manufacturer shall furnish samples of nut locks from a preliminary lot before proceeding with the filling of the order, and shall give sufficient notice in advance of the date when they will be ready for inspection.

The railway company's inspector shall have free entry at all times, while the work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manufacture of the material ordered.

The inspection shall be made at the mill, and the manufacturer shall afford the railway company's inspector, free of cost, all reasonable facilities to satisfy himself that the nut locks are being furnished in accordance with these specifications. The tests and inspection shall be so conducted as not to interfere unnecessarily with the operation of the works.

The tests shall be made of samples of the finished product selected by the railway company's inspector from each separate heat treatment. Two pieces shall be selected for each test and if both meet the requirements of the specifications the lot will be accepted, but if both fail the lot will be rejected. If one of the test pieces fails, a third test piece shall be selected and tested; if it meets the requirements of the specifications the lot will be accepted, but if it fails the lot will be rejected.

If, after shipment, any nut locks are found to be defective, due to material or manufacture, they may be rejected.

5. Marking and Shipping:

When the nut locks are shipped they shall be packed in good serviceable boxes. All boxes must be plainly marked as to material, size and number contained therein. They must bear the name of the manufacturer and name and shipping address of the consignee.

cause of stretching has been made possible, due to the manufacture of heat treated alloy steels, and the only remaining element in the joint to improve upon is the nut lock. The recent development and perfection of a new type of nut lock has very largely accomplished the desired results by introducing a radically different design, involving the use of a double curve (concave-convex) instead of a plain spiral. Tests have shown that the heaviest spiral spring nut lock develops a pressure of but a little more than 3,000 lb. when coiled for a 1-in. bolt, while nut locks of the new design have developed a pressure of from 12,000 to 13,000 lb. When it is considered that the elastic strength of an ordinary 1-in. steel bolt is only about 18,000 lb. it will be realized that the desired result has been at least partly attained. The matter is, however, worthy of still further effort in order to secure a still more powerful permanent reaction.

As to the cost of inspection, this of course will vary with the total number of nut locks to be inspected. Where there are over 50,000 the cost is about 25 cents per thousand, but where smaller numbers are inspected the charge is at the rate of $15 per day and expenses. Where the cost of the washers is $20 per thousand this is but a small added expense, and the ratio is still smaller when the cost is $30 per thousand, as is the case with the improved type of nut lock previously referred to. Even where the cost is as low as $15 per thousand, the inspection adds only 1⅔ per cent to the purchase price.

Old Type Motors Arranged for Oil and Waste Lubrication

MANY different designs of oil cups and several methods of using felt in the oil boxes of the old type motors such as the Westinghouse 12-A, 49 and 68, and the General Electric 52, 54, 57 and 67, originally for grease lubrication, have been tried. C. R. McMahon, master mechanic, Des Moines (Iowa) City Railway, has obtained very good results by cutting out the bottom of the grease chamber in the top half of the motor case to the full size of the chamber. This is done by the use of an acetylene torch after the bottom half of the motor case and the armature have been lowered out of the way. It is not necessary to take the top half of the motor case off the truck to do this cutting out of the bottom of the grease chamber.

The oil slot in the armature bearing should be made at least as large as the hole in the bottom of the oil box, or even a little larger. It has been found that a slot measuring about 1½ in. x 3¾ in. for G.E. 67 motors and 1½ in. x 4¾ in. for G.E. 57 motors is of about the right dimensions to insure proper lubrication for the service on this road.

With the grease boxes cut out as noted above, and making use of the proper grade of wool yarn and oil that is not materially influenced by heat or cold, these old type motors can be lubricated on the 1,000-mile basis both winter and summer with much saving of oil and labor and few hot armature bearings. It is very important that the yarn be kept down close to the shaft and turned over or new yarn put next to the shaft every two or three months in order to prevent glazing, with a consequent stopping of lubrication and a resulting hot bearing.

Interborough Tests Fare Collection and Registration Device

Electro-Mechanical Control Device Has Been Installed at the Ninety-sixth Street-Lexington Avenue Subway Station for Test Purposes

THE Interborough Rapid Transit Company, New York City, is testing what is called a "fare-receiving electro-mechanical control device" at the Ninety-sixth Street-Lexington Avenue subway station. Approximately 4,000 persons pass through this station in the morning rush hour, and six of these new fare devices have been installed to take care of the requirements. In principle the device is somewhat similar to a form of passimeter. The fare, which in this case is a nickel, is deposited in a fare box and this unlocks a pair of arms, permitting the passenger to pass inside a pipe framework. As soon as the first pair of arms return to their normal position a second pair of arms immediately behind these are unlocked, so that the passenger can pass out.

The fare box has an illuminated sign which reads "Drop Nickel Here," with an arrow pointing to the coin receptacle. There is also a dial register which shows the number of passengers that have passed through. The arms which control and operate the mechanism are about 36 in. above the floor level and are arranged in pairs, with one on either side of the pipe framework which admits the passengers. The unlocking of the first pair of arms and the registering of the number of persons that pass through are done electrically, so that there is no mechanical connection between the fare box and the operating arms. The device as at present constructed is arranged so that several 5-cent pieces may be deposited in the coin receptacle and then a corresponding number of persons can pass through the arms of the device. This should prove a convenience where one person wishes to pay several fares.

Some of the advantages claimed for the device are that it will speed up passenger movement through the station, as passengers can deposit their nickels and then pass through without interference, and no time is lost in buying tickets, which is necessary with the present chopping box system. The objectionable features hitherto presented by turnstiles are said to be eliminated, that is, that the device occupies no unnecessary room and there is no idle space. As the pressure that it is necessary to exert against the arms is but 6 to 7 oz. there is no inconvenience to persons passing through.

This installation is for trial and changes will be made as they appear advisable in order to perfect the mechanism to a higher state. The Interborough officials believe that at many of the subway stations such a scheme will reduce greatly the inconvenience the passengers are subjected to by the present ticket system. This device could be installed in numerous places along railings where a passenger with a 5-cent piece could deposit the coin and pass through without further delay. Of course, it would be necessary to have change booths, with attendants, adjacent to all such devices, and probably during rush hours at heavy traffic centers it would also be necessary to have an additional attendant to direct passengers not familiar with the operation. The device is the invention of Frank Hedley, president and general manager, and J. S. Doyle, superintendent of car equipment, of the Interborough Rapid Transit Company.

Maintaining Electric Railway Motors—Part II

Detail Practices for Babbitting Bearings and Dipping and Baking Armatures Are Discussed, with Suggestions for Proper Equipment Necessary in This Work

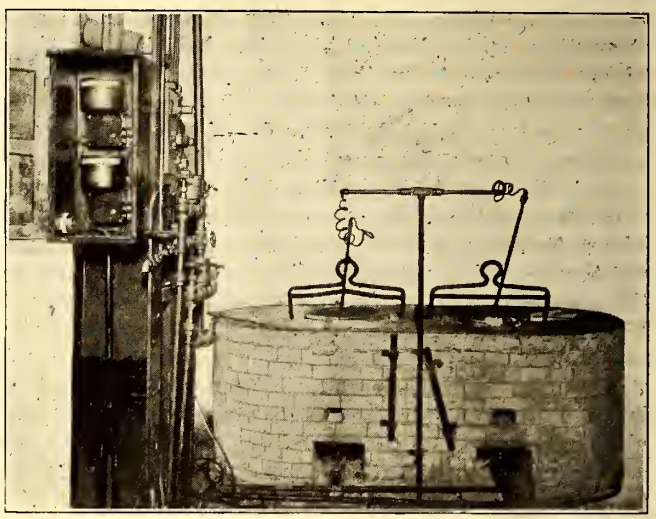
BY JOHN S. DEAN
Industrial and Railway Motor Engineering Department
Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

IN A PRECEDING article published in the ELECTRIC RAILWAY JOURNAL for April 17, 1920, the care and methods necessary in rewinding armatures, smoothing and slotting commutators and correct methods for brush maintenance were discussed in detail. The babbitting of cast iron, malleable iron or cast steel bearing shells is an important work which it is necessary to carry out carefully in connection with railway motor maintenance. In rehabilitating bearings all of the old lining should be removed from the shell. This may be done by heating the shell sufficiently to melt out the lining. All oil, dirt or other foreign matter may be removed by dipping the shell in a solution of caustic potash or by burning. If the burning method is used this should continue until all smoke ceases, showing that all oil and dirt have been burned off. The surface can then be scraped with a file and rubbed down with coarse sandpaper in order to remove all scale and oxide.

Bronze, pipe or steel shells which are tinned should have the old lining removed by heating, preferably in a pot of scrap babbitt, care being taken not to heat them above 375 deg. C. Just as soon as the old lining is melted out the tinned surface should be swabbed with zinc chloride (a saturated solution of zinc in hydrochloric acid) and dipped into a pot of "half-and-half" solder, which should be kept at a temperature of not less than 340 deg. C. and not more than 375 deg. C. If shells are to be babbitted immediately the tinned surface should not be touched after removal from the solder pot. If the shells are to be allowed to cool the tinned surfaces can be brushed off with a piece of clean waste.

In tinning bronze or steel shells the part not to be tinned should be painted with a thin mixture of graphite and water. When dry the part to be tinned should be treated in the manner just described. The shell should be left in the solder until it is just hot enough for the solder to run off, leaving a thin coating. After the shell is removed from the pot the surface to be coated should be rubbed thoroughly with a swab saturated with zinc chloride and then dipped in solder again to wash off all traces of zinc chloride. If any untinned spots can be detected on the surface to be babbitted the operation should be repeated. Steel shells must be pickled to remove the scale before tinning.

CORRECT METHOD OF HOLDING AND STEADYING THE LADLE WHILE POURING BABBITT INTO BEARINGS



BABBITT IN FURNACE AUTOMATICALLY HELD AT CORRECT TEMPERATURE BY MEANS OF THERMO-COUPLES

Iron or steel shells (untinned) should have the mandrel heated to a temperature of approximately 150 deg. and the shell to 100 deg. C. If the shell becomes too hot the time for cooling may be so prolonged as to permit the heavier metals in the babbitt to have time to settle to the bottom end of the bearing. In a case of this kind the metal in the one end of the bearing will be soft and in the other end brittle. Then, again, if the shell should be too cold it will cool the babbitt too suddenly, causing the babbitt to shrink away from the shell. After each bearing is poured the mandrel should be swabbed off with a piece of waste which has been dampened with clay wash. This leaves a thin layer of fine clay dust on the surface of the mandrel, which has been found to be of great assistance in producing smooth, clean bearings free from pinholes and other defects.

For bronze or steel shells (tinned) the mandrel is heated to about 100 deg. C. After each bearing is poured it may be found necessary to cool the mandrel. This is done by dipping it in a clay wash, which leaves on it a layer of fine clay dust, the same as the swabbing for iron and steel shells. When the mandrel is at the proper temperature the water of the clay wash will

THE NEW AND OLD METHODS OF SATURATING OLD WASTE WITH OIL

evaporate very quickly from the surface of the mandrel without any vicious spattering. The bronze shell should be babbitted immediately after it has been tinned, before it loses the heat given to it by the tinning operation.

Babbitt is melted in an iron pot or kettle and maintained at a temperature between 460 and 482 deg. C. It is very necessary that this temperature be maintained when bearings are being poured and that the upper temperature of 482 deg. C. be not exceeded at any time, as in certain grades of babbitt the metal is irreparably damaged if overheated. The use of an automatic regulator is necessary to hold the temperature within these limits. The metal should be stirred thoroughly at frequet intervals, otherwise the heavy metals will settle to the bottom of the pot. The babbitt metal should be kept covered with charcoal or graphite to prevent oxidation.

Babbitt is poured from a ladle in a steady stream directly down along the mandrel to avoid splashing or pocketing of air. The lip of the ladle should be kept free from burrs or other surface irregularities in order to pour a smooth, round stream. If the metal is splashed up against the mandrel it will cause blowholes and give a mushy bearing.

The pouring temperature for babbitt is from 460 to 482 deg. C. and the temperature of "half-and-half" solder for tinning is 340 to 375 deg. C. Iron and steel shells should be preheated to a temperature of 100 to 150 deg. C. and the mandrel for iron and steel shells from 100 to 150 deg. C.

Lubrication of Bearings

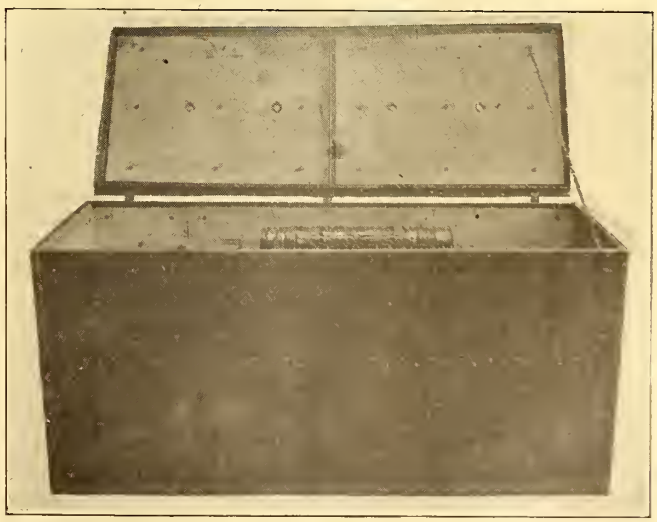
To insure a cool-running bearing it is important that a steady supply of lubricant be fed into it. The supply chamber must be part of the motor and of sufficient capacity to last between inspection periods and so protected as to keep the supply free from dirt and grit. The lubricant should consist of a good grade of mineral oil, light oil in winter and heavy oil for summer use. Very good results have been obtained with special brands of prepared lubricants which are highly recommended by some operators.

For best results a long-fiber wool waste should be used. It should first be saturated in oil for at least twenty-four hours and left on a screen or grating to drain for several hours. Oil wells should be of ample capacity to hold sufficient oil to last between inspection periods. The opening for inspection and refilling should be accessible and be provided with a tight-fitting lid, held in place by a strong spring or bolts to keep out water, dirt and grit. Provision should be made for proper drainage of the spent oil and means provided to gage the depth of oil at regular inspection periods.

Before the bearings are packed all water, dirt and small particles of metal should be removed from the oil well. Saturated waste should be loosely packed in the oil chamber and forced into place by means of a pronged rod of brass or some other soft metal, that it will not injure the journal. In this manner the waste is forced up over the bearing window and its springy action tends to hold it against the journal.

Well-designed bearings when in good condition, properly packed with a long-fiber wool waste and filled with a good grade of oil, should run from one to three weeks between oilings. The time for inspection largely depends upon the system of inspection for other apparatus on the cars, which makes it advisable for each operator to decide from actual conditions the most suitable oiling schedule to fit his equipment. When bearings are inspected all dirt should be carefully wiped from the oil box lid before it is opened, after which the proper measure of oil should be poured into the oil-well opening and not on top of the waste. One to two gills of oil per bearing is required at each oiling period. This varies with the size of motor and the location of the bearings, *i.e.*, pinion-end bearings, commutator-end bearings, armature bearings or axle bearings. The quantity of oil also depends largely upon the length of time between oilings and the service conditions. If too much oil is poured into the oil well the level will rise above the bearing window and the oil will overflow into the motor. This usually injures the insulation and wastes oil. On the average the maximum height of oil in armature bearings for a 50-hp. motor should be about 3.5 in., while the minimum should be 1 in. For axle bearings the maximum should be 2.5 in. and the minimum ½ in. These heights can be checked by means of a rod placed in the oil well.

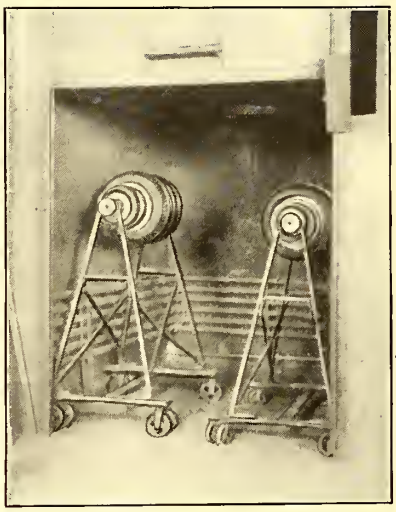
It is considered good practice to repack the bearings every three months. At this time all the waste is removed and that which is glazed and charred is discarded. The bearings are then refilled with good, clean, old waste, to which sufficient new waste has been added.



ELECTRICALLY HEATED OVEN USED IN SHOP WHICH TAKES CARE OF 150 MOTORS

About once a month it is advisable to "tease up" the waste in the bearings to make the flow of oil more effective.

Dipping in varnish and then baking thoroughly fills all cracks and pores in the insulation. This greatly reduces the possibility of breakdowns, which might be caused by filling of these cracks with moisture or other conducting materials. Further, varnish acts as an effective bond to prevent vibration of motor parts. Dipping and baking of comparatively new motors is an insurance against maintenance charges for rewinding. It improves the insulation, fills up the pores, keeps a smooth surface on the coils and prevents vibration. The equipment necessary for dipping and baking comprises a tank to contain the dipping solution, an oven in which to bake and also a means of handling the apparatus. Oil and dirt should be removed thoroughly with clean, compressed air, or a cloth dampened with benzine may be used where the quantity of oil is excessive. To protect the polished surfaces, such as the journal and commutator face, these may be covered with friction tape. It is good practice to rub the journal after the dipping process with a cloth wet with benzine. In drying the part to be treated is heated in an oven to 100 deg. C., so that, with the delay involved in getting it to the dipping tank, it will be at a temperature of 40 to 60 deg. C. at the time of dipping.



BAKING RAILWAY ARMATURES IN STEAM-HEATED OVEN

An oil-proof and moisture-proof baking and insulating varnish should be used at a specific gravity of 0.850 at 15 deg. C. temperature of solution, or 0.846 at 20 deg. C., 0.0843 at 25 deg. C. and 0.840 at 30 deg. C.

If the varnish is too heavy it should be thinned with benzine. Armatures should be dipped in the varnish in a vertical position and allowed to soak until all sign of bubbling ceases (twenty to thirty minutes). If a tank is not available good results can be obtained by turning the armature at intervals of twenty to thirty minutes in a shallow pan with the varnish deep enough so that the bottom of the slots will be completely immersed. The armature should then be turned until all the coils have been thoroughly soaked. If this method is employed the insulation creepage surface at the end of the commutator should be treated by repeated paintings of the varnish. The armature should be drained at room temperature until all dripping ceases and should be kept in such a position that pocketing of the varnish will not occur. Armatures should be supported in a vertical position while baking and the temperature of the oven should be from 95 deg. C. to 105 deg. C. Armatures below 12 in. in diameter should be baked forty-eight hours, armatures 12 in. to 30 in. in diameter sixty hours and armatures over 30 in. in diameter seventy-two hours.

If the armature is baked in a horizontal position it should be given a half turn every fifteen to twenty minutes during the first half of the baking period, otherwise the varnish will drain toward the lower side and throw the armature out of balance.

Some Don'ts and Precautions to Be Observed in the Dipping Plant

Do not use matches; do not smoke; do not use lighted torches, electric hoists or any other device that may produce sparks around the dripping tank, as the varnish is inflammable. If steam is used for heating, do not permit the steam to escape into the oven, thereby giving the apparatus a vapor bath. This is worse than no dipping. Do not permit the temperature to exceed 130 deg. C. and do not rush the baking period. A wet motor is worse than one that has not been treated.

Provide for ventilation of the oven, no matter how small it is made; provide for a complete change of air in the oven once every hour; holes near the top and bottom will usually provide natural ventilation.

Provide uniform temperature of the air in the oven. Place thermometers at various heights in the oven to determine the temperature.

Turn armatures frequently, if they are baked horizontally, to prevent unbalancing due to pocketing of the varnish.

Putting on Pinions

When pinions are installed on railway motor shafts with taper fit, the shaft should be clean and free from burrs or swellings, the pinion bore should be clean and free from burrs and the fit of the pinion bore should be in contact with at least three-quarters of the surface of the taper fit on the shaft. This can be checked by rubbing Prussian blue, thin red lead and oil or thin lamp black and oil on the pinion bore and fitting it on the shaft.

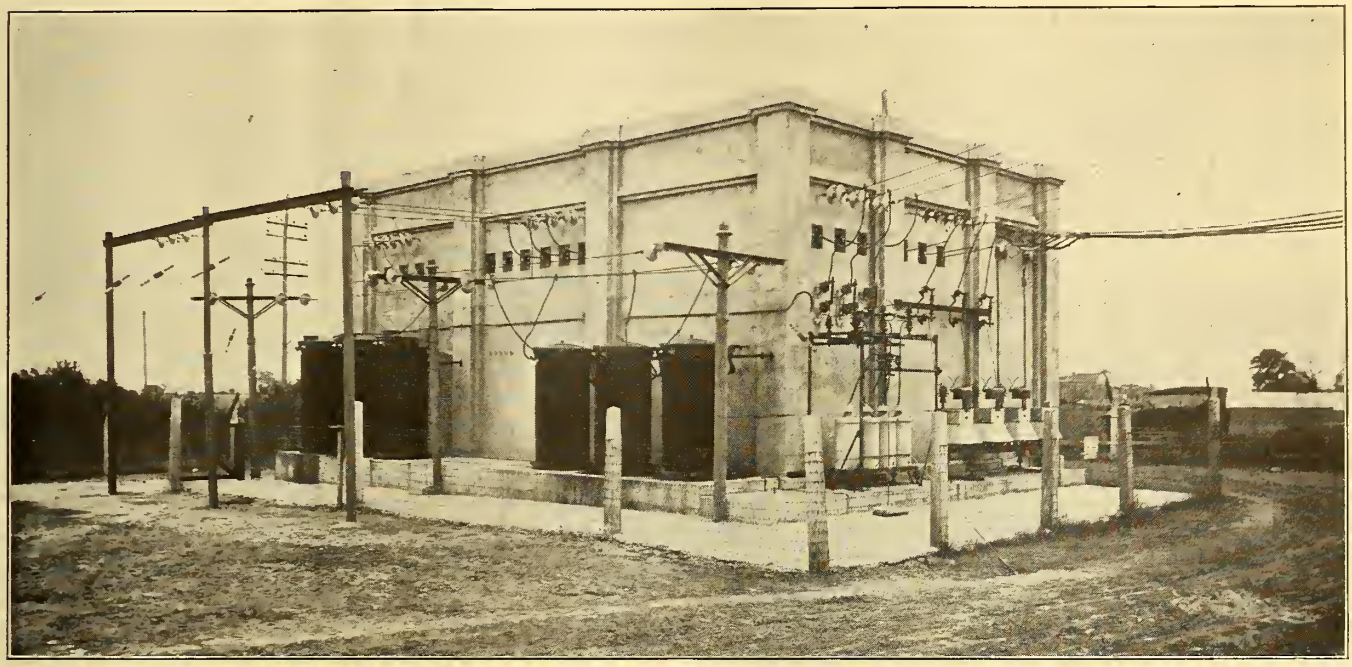
After the above points have been taken care of the pinion should be put on the shaft cold to make sure that the keyway in the pinion is the proper size for the key mounted on the shaft and that the pinion does not ride or bind on the top and sides of the key and will not ride the key when pressed further on.

The keyway on the pinion can be 0.002 in. larger, but not less than, the key. There should be at least $\frac{3}{64}$ in. clearance between the top of the key and the bottom of the keyway in the pinion. The corners of the key should not cut into the fillet of the keyway. To prevent this the corners of the key should be rounded.

Pinions up to 3-in. bore should be heated in boiling water for thirty minutes, and those with 3-in. or larger bore for sixty minutes. To prevent rusting and to insure a clean surface at the fit washing soda should be added to the water in the proportion of $\frac{1}{4}$ lb. of soda to 5 gal. of water. When the pinion has attained the temperature of the boiling water, namely, 100 deg. C. (212 deg. F.), it should be taken out of the water and the bore quickly wiped clean. Without allowing the pinion time to cool it should be tapped on the shaft with a 6 or 8 lb. sledge hammer, using a heavy piece of wood or copper between the pinion and the hammer. This sledging is not to get a driving fit, but to make sure that the pinion is home and well seated. Three or four taps evenly distributed around the pinion end should be enough. The pinion nut with lock washer can then be screwed home tight with a wrench having a purchase or lever arm of 3 or 4 ft.

Energy Supply System Doubly Safeguarded

Two Principal Substations Are Tied Together on Both the Alternating-Current and Direct-Current Sides for Emergency— New Substation a Neat Layout



TRANSFORMERS AND LIGHTNING ARRESTERS INSTALLED OUTSIDE FIVE MILE SUBSTATION, CHARLESTON, S. C.

THE Charleston Consolidated Railway & Lighting Company, Charleston, S. C., has safeguarded the continuity of energy supply to its street railways by a double interconnection of its old and new power houses, which are also the two main substations for the railway system. Under normal operation all energy for both railway and lighting purposes is generated at the 10,000-kw. Charlotte Street power plant, located very close to the center of the city. In this station are located two 500-kw. motor-generator sets and one 300-kw. rotary converter in addition to the generating equipment.

About 2 miles distant from this power plant is the old Meeting Street power station, which is maintained as a reserve generating station and operated only under emergency conditions. It is equipped with two 200-kw. Ball & Wood horizontal tandem-compound generating units and one 525-kw. vertical cross-compound unit. These are all direct-current units and maintained in operating condition. When active use of this generating equipment was discontinued some years ago a 500-kw. motor-generator set was installed in the station to take care of the railway load in that vicinity, making use of the feeder cables which had formerly supplied the entire system. For the operation of this motor-generator set two parallel 13,200-volt alternating-current lines were erected between the two power plants. The two plants were also tied together by two 750,000-circ.mil overhead cables which were connected between the 625-volt buses. This double tie was made to provide for emergency conditions, which may be outlined as follows:

With the construction of the new Charlotte Street station and the installation of 1,300-kw. capacity of converter and motor-generator equipment this became the center of the direct-current distribution system. If anything happens to take either the big generators or the railway machines at the Charlotte Street power station off the line the direct-current reciprocating units at the Meeting Street plant can be started up. They are able through the direct-current tie lines to supply nearly 1,000 kw. to the 625-volt buses in the Charlotte Street plant for distribution there over the outgoing feeders. Except for the peak load period, which requires about 1,500 kw., this is adequate to carry the entire railway load, and while under such an emergency the lighting and power business of the city might be interrupted, at least the railway service could be continued. Also, if the high-tension lines between the two stations should be blown down or the alternating-current energy supply to the Meeting Street station otherwise interrupted it is possible to supply direct-current energy from the Charlotte Street station to the direct-current buses at the Meeting Street station for distribution over the outgoing feeders there, up to the limit of capacity of the railway machines in the Charlotte Street plant.

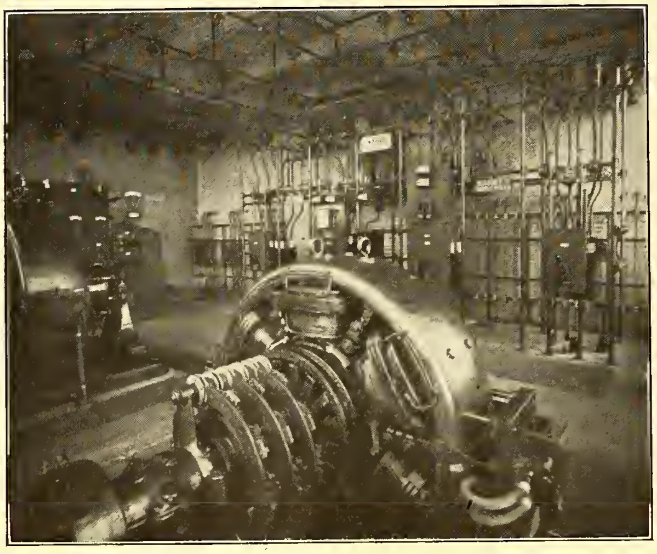
New Substation Five Miles Out

The distribution system for the railways in Charleston was recently amplified by the addition of a new substation located about 5 miles out on the long suburban line which extends out to the Charleston Navy Yard, a distance of about 7 miles. This is pictured inside and out herewith. One of the 13,200-volt lines connecting the Charlotte Street power house to the

Meeting Street station was extended out the navy yard line to supply Five Mile Substation. The continuity of the alternating current supply to this station is also safeguarded by a second high-tension line from the Charlotte Street station, constructed along a different and more direct route to the new substation. Each of these lines is connected into the substation through a separate bank of 13,200/440-volt transformers which are installed along with the lightning arresters on concrete platforms outside of the building.

Switching Facilities Permit Wide Range of Connection of Substation Apparatus

The high-tension lines enter the building at one end and are carried on a pipe frame across the ceiling within the substation and down through the high-tension oil switches, thence out to the high-tension side of the transformers, which are just outside the rear wall.



ROOMY ARRANGEMENT OF EQUIPMENT WITHIN THE NEW SUBSTATION

The low-tension lines from the transformers are brought directly through the rear wall at a level about even with the tops of the transformers, thence down the inside wall and under the floor to the machine switches. Any possible combination of connection between the two high-tension lines, the two banks of transformers and the two converters may be secured by a proper setting of the knife switches, twelve of which are located along the top of the high-tension frame work seen along the back wall inside the substation.

The station is equipped with two 500-kw. rotary converters, which are controlled through two main line and two machine switch panels. The high-tension equipment is all installed along the back wall, except for the alternating current starting switches for the two machines, which are located with the feeder panels along one end. The building itself was constructed with brick walls covered with stucco and with a concrete floor and roof.

An effort has been made to minimize electrolysis in the vicinity of the Charlotte Street power plant by installing a negative return system on all railway lines. No circuits whatever in the station are grounded, so that practically no path is possible for the return of the current to the negative buses except that which enters by way of the rails and negative cables leading into the station.

Unique Chimney Mounting at St. Joe

Steel Stack Installed on Reinforced Concrete Structure Supported on Caissons Extending to Bedrock, Nearly 75 Ft. Below

ON account of the lack of floor space on the site of the steam power plant of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., the company found it necessary to install a 16-ft. self-supporting steel stack, 225 ft. high, on a reinforced concrete structure. The space under this will be utilized for heater, meter and pump rooms.

The concrete structure is 30 ft. square and 40 ft. high above the boiler room floor and is in turn supported at each corner on a caisson extending to bedrock, nearly 75 ft. below the boiler room floor. These caissons are reinforced concrete shafts 6 ft. in diameter, with a hole 3 ft. in diameter through the center. They were sunk to bedrock partly by the open and partly by the pneumatic method, after which the hole through the center was filled with a lean concrete.

The caissons are connected above the basement floor by heavy reinforced concrete arches and girders. Above the boiler room floor the structure has eight columns around the perimeter and one through the center, with three floor levels. The entire structure is reinforced to carry the weight of the chimney and equipment and also to take care of the pressure set up by the action of the wind on the stack, the velocity of which was assumed at 100 m.p.h.

The boiler room level of the structure will serve as a pump room and will contain two Manistee and two Cameron steam-driven centrifugal boiler feed pumps. On the next level will be two 2,000-hp. Hoppes and two 4,000-hp. Cochrane open-type feed-water heaters and a 1,000-cu.ft. hot water storage tank.

The third level will be almost entirely occupied by a 2,000-cu.ft. storage tank for the condensate returned from the various surface condensers. On the top level will be the chimney, with a base diameter of 29 ft., and eight Hammond water meters.

The chimney was designed and fabricated by the Kansas City Structural Steel Company and will be lined with Vitrebestos stack lining, manufactured by the Johns-Manville Company. This lining will be 2 in. thick in the bottom third and 1½ in. thick for the upper two-thirds of the chimney. The lining will not only protect the chimney against corrosion but will also tend to maintain the temperature of the gases.

The caissons and substructure required 660 cu.yd. of concrete and 50 tons of reinforcing steel. The chimney and substructure without the equipment weigh approximately 1,450 tons, or about 13 tons per square foot on the rock.

New Boiler Room Recording Device

A boiler room recorder which measures and indicates both carbon dioxide and carbon monoxide has been perfected by the Mono Corporation of America, Buffalo, N. Y. The purpose is to provide a check upon the fireman so that in producing a high percentage of CO_2 he shall not produce any considerable quantity of CO. The makers of the instrument have also devised a premium system to be used in connection with it in encouraging economical firing.

Construction and Maintenance of Grade Crossings on Pacific Electric

Where Soil Will Not Produce Natural Crossing on Interurban Lines Graded and Oiled and Oil Macadam Crossings Are Standard—Central Plant Erected for Heating Oil and Mixing Macadam

BY CLIFFORD A. ELLIOTT
Cost Engineer Pacific Electric Railway Company, Los Angeles

STANDARD TYPE OF OIL MACADAM ROAD CROSSING CONSTRUCTED BY PACIFIC ELECTRIC RAILWAY

THE Pacific Electric Railway Company, which operates 1,094 miles of interurban lines in southern California, faces the problem of maintaining approximately one thousand road crossings which intersect its lines. This gives about one crossing per mile of single track. The existence of so many crossings is due to the large mileage of good roads maintained by the counties through which the railway lines are operated. Ninety-five per cent of these highways, main ones as well as numerous branch and cross roads, are improved either with a permanent type of pavement, with light oiled screenings, or are graded, rolled and oiled. Due to the great local oil production with a resulting low cost, it has in past years been common practice for counties and municipalities to give considerable attention to the oiling of public thoroughfares.

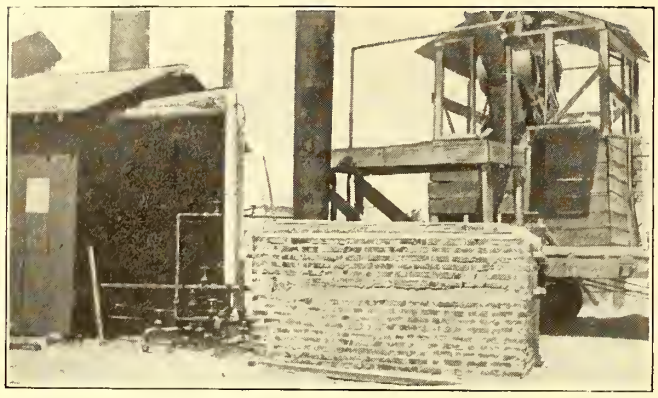
In many of the municipalities permanent types of paving have always been laid. When those streets which intersect the railway lines undergo improvement legal or franchise requirements obligate the railway company to make similar improvements for the width of its franchise strip at the street intersection. Usually the same type of pavement as placed by the municipality on the balance of street is laid, but there are instances where the street paving specifications governing the municipality's improvements do not prove satisfactory for placement in and about the rails of the interurban railway tracks. This is especially true where such improvements call for a solid concrete type of pavement, as due to its rigidity this is an unsatisfactory type for road crossings. It is difficult and expensive to maintain around rails at a street intersection, where the elevation of the rails in some cases is slightly above the grade of the street and necessitates a paving run-off to produce accessible approaches in order to provide a reasonably smooth and improved road crossing.

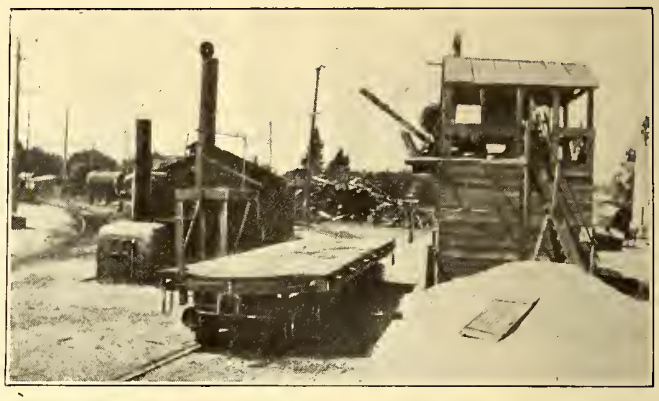
The municipal or county officials are generally in accord with the company in modifying the specifications to meet this situation, and in most instances they grant permission to the company to pave its tracks at such road crossings with the company's standard type of oil macadam pavement. This class of paving also is commonly used in other road crossings where the company sees fit to render such improvement without solicitation, thereby complying with the requirements of the State, that where railway or railroad tracks cross public streets or highways, whether or not the thoroughfares are improved, the railway company is obliged to maintain safe and passable crossings at intersections with its tracks.

Approximately 75 per cent of the one thousand crossings on the Pacific Electric lines are permanently improved, while the balance are either the graded or oiled type of road crossing. In the foothills and mountainous districts, where durability and hardness of soil in time produce a natural road crossing, a little oiling and refilling with gravel or screenings considerably lessens the maintenance expense. Where the lines penetrate valley districts the soil is usually soft and loamy and an oil macadam crossing is essential. In the territory contiguous to the Pacific Ocean, where the soil is of a sandy nature, an exceptionally rigid type of oil macadam road crossing is demanded, as with the soft yielding subsoil it requires much effort to construct and maintain a lasting crossing. At the time of placing the oil macadam it is difficult to obtain the desired subgrade, and the steam roller

is obliged to give two or three times the number of rollings when the crossing is being constructed or repaired in order to obtain the desired results.

Prior to the year 1911 our organization for handling the oiling of road crossings and paving with oil macadam was incomplete, as this class of construction and maintenance work was in its infancy. The paving organization was obliged to heat the oil with the steam rollers and this method consumed 50 per cent of the time the rollers were in service. Where work of this nature required attention of any magnitude it was necessary to go to the trouble and expense of constructing an oil pit to heat the oil shipped to each of the various jobs. In addition, expense and loss of time were incurred while pumping the oil into the pit, as well as in pumping it again into the oil tank sprinkling wagons for distribution on the job.





OIL MACADAM MIXING PLANT OF PACIFIC ELECTRIC RAILWAY. AT LEFT—MAIN BOILER ROOM, SUPER-HEATER OUTFIT AND EQUIPMENT FOR STEAMING OUT OIL TANK CARS. AT RIGHT—OIL MACADAM MIXING PLANT

As the number of road crossings and miles of paved streets in the maintenance program was constantly being increased, it was deemed expedient more efficiently to organize the paving department and to set up an oil heating and oil macadam mixing plant. This was located approximately three miles from the central portion of the city of Los Angeles and is accessible for handling the work with dispatch. In the erection of this oil macadam mixing plant strict economy was practiced. Second hand engines and boilers were utilized where they were of no further service in the power plants or car shops. Buildings for housing boilers and engines also were provided from second-hand material reclaimed from other structures on the lines. When this plant was first established a second-hand 30-hp. boiler was transferred from the car shops to be utilized in heating the oil and a suitable boiler room was erected. This boiler is operated by burning distilled oil, but is also equipped with a fire box for burning wood. Scrap bridge piling and building material is accumulated for this purpose.

The boiler room is located between the underground concrete oil storage pit and the super-heater. The oil storage pit has combination wooden covered doors, so that the pit can be easily entered for reaching the 1,400 lineal feet of 1-in. pipe maintained in the pit for surface heating of the oil. Steam from the boiler room at a maximum steam pressure of 80 lb. is forced through a connecting pipe into the 1-in. surface pipe heating system. The capacity of the oil storage pit is approximately 25,000 gal. and it will accommodate the contents of two standard railroad tank cars, or four of the company's small size standard tank cars. A small steam-operated pump, with a steam line from the main boiler room, is located 12 ft. below the ground level on the same plane with the bottom of the oil heating pit. This conveys the oil by pipe line into the super-heater for the purpose of increasing the first heat of 150 deg. to 350 deg. before the oil is conveyed to the oil macadam mixing machine.

All crude oil used must have a grading of 90 per cent asphaltum. The degree of heat obtained is 350 to 400, and when ready to apply to the rock the average existing degree must not be less than 250 deg. Twelve hours is required to heat one tank of crude oil, during which period 100 gal. of distillate oil is consumed by the boiler and 1,200 gal. of water is used. Three-fourths inch rock is used in this type of oil macadam for road crossings and 10 gal. of oil is applied to one cubic yard of rock.

Two men are used in heating the oil, one a licensed stationary engineer and the other a laborer to operate the pipes. In mixing oil macadam four additional laborers are used. An average of four to five cars of oil macadam can be mixed during a twelve-hour period. This is loaded on flat cars averaging 16 cubic yards per car ready to ship to the job.

The oil macadam mixing drum is located in the tower of the mixing plant. The hoppers and mixer are operated by a small steam pump connected with the main boiler room and a shut-off lifting door regulates the quantity of rock it is desired for the hoppers to gather up. Check valves also regulate the quantity of oil entering the mixing drum when the material is being made up. As rapidly as the oil macadam is mixed it is conveyed by a drop chute onto flat cars set on a working track located between the oil heating plant and the oil macadam mixing plant. The piping system through which the oil is conveyed is, after work is suspended, thoroughly and immediately steamed out with connecting steam pipes in order to avoid stoppage of the piping system when the oil cools.

When oil is being heated, either for shipment to some job where it is to be applied directly upon rock already in the track or for use immediately at the plant in mixing road crossing oil macadam, after being conveyed from the main-heating pit to the super-heater and the desired heat obtained, it is conveyed either into the tank car for shipment or to the mixing machine. When these sources of use are cut off a by-pass pipe carries the oil from the super-heater back into the main heating pit.

At this plant facilities are maintained also for han-

dling the steaming out of oil cars set out by the transportation department. An efficient working rack for pipe line and pipe fitting apparatus used to steam out the cars is provided adjacent to the two tracks allotted to this work. A large underground pit, with a storage capacity of two standard railroad line tank cars, is used to accumulate the waste oil, which is at first drained from the tank car into a seepage drainway and thence into the pit. A steam line is connected with the main boiler room of the oil macadam plant and a separate pump is used in thoroughly steaming out the remaining waste oil in the tank cars. It requires two days to steam out one tank car, employing one stationary engineer and one laborer.

As many as twelve barrels of waste oil are accumulated at times from steaming out two standard tank cars. Due to the many classes of oil handled in these tank cars the waste is useful only for the ordinary oiling of the roadway to suppress dust and weeds. If the oil is of proper grade it is barreled and stored for this use as it is collected from time to time. Several municipalities have effective ordinances requiring the railway company during the hot and dry weather to re-oil its roadbed upon order of the Street Superintendent. The company ships the oil to the job and sprinkles the oil about the tracks with tank sprinkling wagons.

When an oil macadam road crossing is to be constructed or repaired the responsibility for the work does not necessarily rest with the paving organization, as frequently in the interest of economy the material after being mixed at the plant is shipped to one of the roadmasters on the system. The track gangs in handling track repairs at the road crossings can satisfactorily unload, apply and tamp in the oil macadam to good advantage. Usually 8 to 10 cu.yd. of oil macadam provides a first-class road crossing, or one car of 16 cu.yd. will take care of two locations.

In addition to the mixing of oil macadam for road crossing repairs or new construction, a special type of oil macadam, using pea size rock, is mixed at frequent intervals when needed to patch up temporary depressions in asphalt paved streets in the cities, or for temporary paving repair work around joints excavated for bonding repairs or for tightening and shimming up. This special class of oil macadam is frequently used as temporary paving around special trackwork layouts where minor parts have been excavated for repair or renewal. When such work is to be undertaken the foreman of the plant is notified to mix up the required batch of this type of oil macadam which, when prepared, is moved with dispatch to the job and if necessary handled by one of the engineering department's auto trucks. A one-ton dump truck is usually delegated to perform this task, as the larger type of dump truck moves with less speed and is cumbersome to operate in congested traffic districts.

The Pacific Electric Railway Company also uses oil macadam quite extensively on straight-away stretches of track, but the type of oil macadam used for this class of work is of a different specification from the mixture used for road crossing work. This type of paving ranges in depth from 2 in. to 5 in. The 2-in. depth of paving is laid only where it is the intention to provide a light type of paving, while the 5-in. depth is for a permanent job for the full depth of rail. This pavement is not used around girder rail, but usually around 50 lb., 60 lb., 70 lb. and 75 lb. T-rail. Three sizes of rock are used, *e.g.*, ¾-in., 1½-in. and 3-in. sharp and angular crushed rock, while the final dressing is pea size screenings of ¼-in. crushed rock and granite dust. The rock used must be of such quality as to pass the abrasion test of the city of Los Angeles.

Asphaltic oil is used and applied at a temperature of not less than 250 deg. F., nor more than 410 deg. F. It is required that an asphaltic oil be furnished with no admixture of any artificial or refined products and that it shall contain not les than 92 per cent of asphaltum at 80 deg. penetration, District of Columbia standard, when 20 gr. are heated to a temperature of 400 deg. F. in an uncovered cylindrical dish 2¼-in. in diameter. The residium at 80 deg. penetration must not contain more than 2½ per cent of sulphur and must be soluble in carbon tetrachloride to the extent of at least 99.8 per cent and the oil must not contain more than 2 per cent water and sediment.

The pavement is laid on the roadbed in three courses, as follows: The first course consists of the lower two-thirds of the entire pavement and is placed on top of the ties laid with crushed rock that will pass a 3-in. ring and be retained on a 2½-in. screen. The mass is rolled

STANDARD TYPE OF GRADED AND OILED ROAD CROSSING BUILT BY PACIFIC ELECTRIC RAILWAY

STANDARD TYPE OF GRAVELED ROAD CROSSING PRODUCED BY NATURAL SOIL CONDITIONS

TABLE I—MATERIAL USED WITH 2-IN. OIL MACADAM

Amount of pavement laid	10,444	sq.yd
Oil used per square yard	0.5578	gals.
1½-in. crushed rock used per square yard	112.3	lb.
¾-in. crushed rock used per square yard	48.3	lb.
¼-in. crushed rock used per square yard	28.6	lb.
Total amount of crushed rock used per square yard	189.2	lb.
Average men days per square yard pavement	0.04	
Total oil used	257.79	bbl.
Total men days	434	
Total time trucks used	2½	days
Total time teams used	24	days
Total time work motor used	24.5	hrs.
Total time coal used on roller	22.5	days
Total coal consumed by roller	8.65	net tons
Total crushed rock used size 1½ in.	586.9	tons
Total crushed rock used size ¾ in.	252.45	tons
Total crushed rock used size ¼ in.	149.8	tons

dry with a 12-ton, three-wheel Monarch steam roller. Six inches each side of the rail and down to the top of the tie is slotted up with ¾-in. crushed rock, after which it is wet down and again rolled until all slack is removed and it ceases to creep. Such portions as cannot be reached with the roller are tamped to grade by hand.

The second course, consisting of 1½-in. rock, is laid and rolled dry into the base course with the same type of roller and as the rolling progresses sufficient 1½-in. rock is spread over the surface from time to time to thoroughly bind the broken stone foundation and form a true surface. It is then wet and rolled until all creeping ceases.

All depressions and low spots are brought to an even grade and the entire mass is again rolled. The first coat of oil is then applied at the rate of approximately ⅞ gal. to the square yard. The oil is covered immediately with the third and last course of ¾-in. crushed rock, rolled and all depressions brought to an even grade. The rolling is continued until the rock ceases to crawl and the surface is smooth and to grade, when the second coat of oil is applied at the rate of approximately ½ gal. per square yard. This is covered immediately with ¼-in. crushed rock or pea gravel of sufficient quantity to absorb all surplus oil. The entire mass is dampened and rolled until hard and smooth, all depressions being brought to an even grade. After the elapse of a week or ten days all surplus ¼-in. rock is swept up, care being exercised that the slotway is left clear of all dust and rock.

This class of oil macadam has given excellent results, is favorable in appearance and meets with hearty approval by all the municipalities in which it has been laid. At times when certain cities improve their streets with a concrete base and asphalt wearing surface type of pavement the railway company upon petition to these municipalities is frequently favored with permission to substitute on its franchise right of way strip its high grade standard type of oil macadam pavement.

On a job of this nature performed in October, 1918, the oil macadam pavement was placed for a depth of 2 in. in and about 4½ in.—60 lb. A. S. C. E. rail. The rail was not renewed and the ballast was highly crowned to consume the balance of the depth of rail. This was a double track line paralleling the Pacific Ocean in one of the nearby beach towns. The results shown in Table I were obtained.

TABLE II—MATERIAL USED WITH 5-IN. OIL MACADAM

Amount of pavement laid	15,693	sq.yd.
Oil used per square yard of pavement	1.58	gal.
3-in. crushed rock used per square yard of pavement	351.4	lb.
1½-in. crushed rock used per square yard of pavement	115.0	lb.
¾-in. crushed rock used per square yard of pavement	111.0	lb.
¼-in. crushed rock used per square yard of pavement	23.0	lb.
Total amount of crushed rock used per square yard of pavement	600.4	lb.
Average men days per square yard pavement	0.079	
Total men days	1253.2	
Total amount of 3-in. crushed rock used	2757.45	tons
Total amount of 1½-in. crushed rock used	902.67	tons
Total amount of ¾-in. crushed rock used	871.53	tons
Total amount of ¼-in. crushed rock used	185.95	tons
Total	4717.60	tons
Total oil used	24,795	gals.
Teams used	.70	days
Work motor used	9.43	days
Coal used in 642 days on steam roller	225	tons

Another comparison is afforded by a job performed in March, 1918, at an inland town where the full 5-in. depth standard type of oil macadam was placed in and about 5-in., 75-lb. T-rail. This also was double-track construction. The results shown in Table II were obtained.

Where a very light temporary type of gravel and oil pavement is placed upon the surface of the tracks after they have been graded and the back fill accomplished until the grade material is flush with top of rail it has been found that the following materials and labor are required: 1 cu.yd. screenings will cover approximately 500 sq.ft. of roadbed. One laborer can spread approximately 25 cu.yd. screenings per ten-hour day. Three-fourths to 1½ gal. of oil approximately covers 1 sq.yd. of screenings.

Coal Situation Really Serious

THE acute shortage of coal is growing worse in several sections of the country. New England is particularly hard hit. It would occasion no surprise if several railway companies in the country would be compelled to curtail service materially if not to shut down entirely in the next week or so. One New England community is already reported to have been without light, either gas or electric, for a period of three days, due to coal shortage. One electric railway, at least, has entirely stopped service on two lines, on account of coal shortage. Other companies are known to have only a few days' supply on hand.

The demand for what coal can be shipped has forced prices to unheard-of figures and still higher figures are quoted as bid by industries which are almost at the end of their rope. It is reported that $12 and $13 per ton for tidewater bituminous coal is being paid, and double that or more offered for resale.

The causes are apparently (1) the almost absolute lack of movement over the railroads, either to supply empty cars to the mines or to move loaded cars now on the systems and (2) the Atlantic seaboard labor conditions in connection with the movement of coal in barges. No particular relief is in sight.

Historical Investment Basis Used

THE Consolidated Gas Company, which is a historic company before commissions and courts, has been supported in its valuation contentions by Special Master A. S. Gilbert before the U. S. District Court. The principal points were basis of valuation and rate of return. On the latter point the master proposes an 8 per cent return. On valuation he says: "Although I have no doubt that the present reproduction cost would be at least as much as the sum arrived at, for reasons elsewhere indicated, I feel on sounder and fairer ground in basing my conclusions upon the actual investment in the property, proof of which was offered in the first instance by the defendants and by the complainants in rebuttal."

If this report is approved by the court the company's request for an injunction against the enforcement of the 80-cent gas law will probably be granted.

General Dawes Blames Chicago Politics

Present Price of Securities Forced Below Intrinsic Value by Politics—Public Ownership, with Increased Taxes, Probable Result

IN THE statement that, as a tremendous penalty on the public for the continual attacks of politicians, public ownership of utilities was practically the only way out, Gen. Charles G. Dawes, president Central Trust Company of Illinois, summed up his cross-examination by city representatives before the Public Utilities Commission of Illinois May 12. He had appeared before the commission in the continuation from April 29 of the hearings being held to investigate the general financial difficulties of the utilities, particularly their inability to finance new extensions and betterments ordered by the commission. After testifying at the previous hearing, the General took a week off, he said, to investigate what the dragging of transportation matters into politics had really meant in the Chicago situation. At the conclusion of the cross-examination he presented a statement in which he said in part: "The plutocrats in the Chicago street car situation, as they are usually referred to, are the unfortunate scattered holders of the secondary obligations of the surface lines which represent an agreed-upon valuation arrived at after long negotiations between the roads and the city in 1907. The market value of these secondary obligations, before the city administration put the blight of politics upon them, was $65,900,000, and even this figure represented a large loss upon the securities of the old street car systems. But now that the great business question of transportation has been dragged into politics the market value of the secondary securities is $24,500,000, representing a fall in the market of $41,400,000. The annual income now paid the holders of these secondary securities is about $3,200,000. Under these political attacks, the first mortgage bonds of the surface lines, which are the only source of new money supply for rehabilitation purposes, are selling on about a 14 to 15 per cent basis. In these times of credit stringency the railroads and other public utilities not subject to attack by the demagogues are having to pay as high as 7 and 8 per cent for their money and much of it is not as well secured actually as are the first mortgage bonds of the Chicago Surface Lines. The difference between a 7 per cent interest rate and about a 14 per cent interest rate, to wit, 7 per cent, is the financial measure of the effect of the fight of the political demagogues upon the street car company.

Confiscation Won't Solve Problem

"The testimony of Mr. Blair and the experts at the last hearing was that the Chicago Surface Lines need $10,000,000 to $15,000,000 immediately and probably $10,000,000 per year for the next ten years. In other words, even if the income of the secondary security holders, amounting to $3,200,000 annually, were confiscated, an extra charge of $700,000 to $1,000,000 in addition to the ordinary rates for money would have to be imposed upon the people to get the means immediately necessary for the roads, and $700,000 additional each year thereafter to provide the money necessary to keep them up. Within about four years the entire annual income forced away from the secondary security holders would have been dissipated in the extra cost of capital alone to the roads. This would be done in the name of the interests of the people.

"Let no one deceive himself as to this. The old property of the Surface Lines might be confiscated, but old property will not rehabilitate the lines. New money must be invited into the enterprise, and in a city where political attacks have brought the market price of first mortgage bonds from 98 down to 60 in a few years new capital will not consent to put its neck into the noose a second time without charging heavily for it, if at all.

"I do not believe that even a 15 per cent rate would secure this money based upon conditions which have existed for the last two years in the city of Chicago. The question is immediately raised whether the politicians have not already made it impossible for the Chicago public ever to have a satisfactory street car service that will operate under a reasonable expense to it. The political slogan of a 5-cent fare is too popular to be readily abandoned. Having made the operation by private companies under reasonable rates impossible, it would seem to be the policy of the city government to take over the property at confiscatory prices if possible and then to conceal the inevitable increase in the cost of transportation to the public in the shape of heavier general or special taxes. The total confiscation of the interest of the secondary security holders, with the moral injury to the community ignored, would not, in my judgment, save the public one-half what these politicians and their methods will lose it.

"The proper solution of the question, of course, would be the restoration of the general credit of public utilities under the State Commission, which would enable capital to be secured for the roads upon a reasonable basis so that under the control of the commission they would be operated at the least possible cost to the public with the best possible service. But the restoration of credit, even with as strong a commission as this one, can never occur until the attacks of the city demagogues cease, and I for one see little hope for such an occurrence in the city of Chicago. The demagogues who have brought into politics this great question of city transportation are the real enemies of the people. They would place under heavy sacrifice the interests of their city and the public for their own petty and temporary political advantage."

Amortize Present Excessive Costs

Other witnesses heard before the commission were James B. Forgan, president of the First National Bank and of the First Trust and Savings Bank; Harry A. Wheeler, vice-president Union Trust Company of Chicago and formerly president of the United States Chamber of Commerce; Charles Piez, president the Link Belt Company and the Electric Steel Company; Charles W. Folds, a Chicago investment banker, and Donald Richberg, special counsel for the city in gas matters. Mr. Forgan testified along much the same lines presented by the bankers at the previous hearing, attributing the inability of the utilities to finance new work primarily to the loss of confidence of the public and a feeling on its part that under the restraint of public regulation they were unable readily to absorb large fluctuations in operating costs. Mr. Wheeler advocated that there should be no extensions made during these abnormal times except those absolutely essential. He said that a rate of fare should be granted high

enough not only to provide a rate of return that would attract the necessary new capital but also to make possible the payment of a part of the abnormal expenditures involved in new work out of surplus earnings, so that this would not continue to be an undue burden upon the future car riders. He attributed the antipathy of the public to utility securities to loss of confidence and to the great increase in the number of industrial securities now offered on the market in competition with them which are free from regulation, are sound and in general offer a higher rate of return. He declared that any rate of return to be satisfactory must be such as will meet this competition and permit the payment out of operating expenses of improvements in order to keep down the capitalization of abnormal costs now prevailing. Mr. Piez presented the viewpoint of a manufacturer, testifying that industrial progress of the community is being seriously hampered by the inability of the utilities to keep pace with the requirements. He said they should be permitted to be prosperous so that they could keep ahead of requirements rather than lag behind them. He expressed the view that the popular prejudice against utility securities was a reflection in large measure of the attitude for years back of the Interstate Commerce Commission in considering its regulatory function in the nature of restraint.

It was brought out in his further testimony and in subsequent questioning of Samuel Insull that the present low value of existing securities was not at all a question of their underlying value. Referring to the Chicago Elevated System, Mr. Insull said there was a tremendous margin of property in excess of the prior lien securities. It was simply a question of the earnings being inadequate to carry these securities. B. E. Sunny and Henry A. Blair were also cross-examined by Chester E. Cleveland, representing the city, but the cross-examination during the entire hearing was largely irrelevant and brought out little of value to the commission or to the city in solving the immediate problem of providing for extension of facilities.

The original hearing of April 29 was reported at length on pages 939-941 of this paper in the issue of May 8.

On May 3 the so-called down-state public utilities were heard at Springfield, Ill., by the Public Utilities Commission, the inquiry into their financial needs being along the same lines as that held in Chicago.

An Incentive for Good Management

Outline of a Reward-for-Management, Service-at-Cost Plan with Reward Based on Volume of Traffic

BY T. FITZGERALD
Consulting Electric Railway Engineer, Pittsburgh, Pa.

WE HEAR some talk these days of the necessity for unselfish devotion to the interest of the community on the part of men engaged in public utility management. It has been found, however, that human nature is such that an adequate reward must be paid to secure the mental or physical labor of men.

If a community wants good street railway service it must pay an adequate price for it. When the company and the community work harmoniously along sound economic lines there will result both the quality and the quantity of service demanded by the car riders at a price as low as possible for that service.

The law of supply and demand controls today just as it has always. The necessary precedent to the supply of any product is a demand for that product at a price which will pay for its cost, which cost includes a reward sufficient to attract capital and brains for the production of the product. If the cost of production requires a price too high for the demand, the supply cannot be continued. The price is sometimes paid in an indirect manner, as in the case of practically all municipal waterworks.

It is believed that there is sufficient demand for street railway service in large communities to provide for a supply at a price which will pay the cost of production including the necessary reward for management.

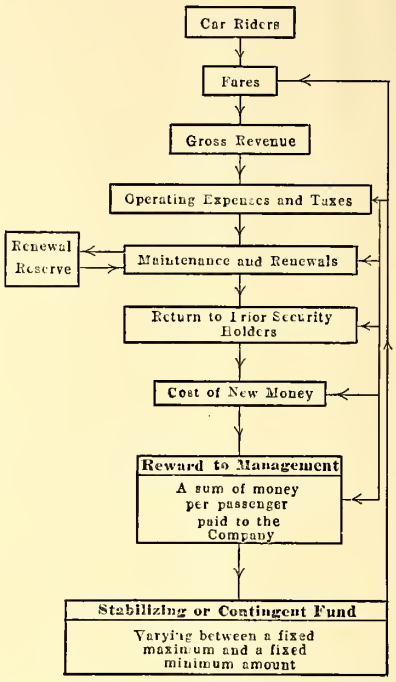


DIAGRAM SHOWING DISPOSITION OF ITEMS UNDER PROPOSED PLAN

It is also believed that, with an agreement based on sound economic laws, private ownership and operation of street railways will bring about the best results for the capital and the community interested. In most agreements between cities and street railways the Cleveland "Tayler" plan with modifications has been worked out. The Cincinnati plan has been referred to frequently as the most satisfactory solution of the problem yet devised. Regarding the Cleveland agreement, the remarks of Mr. Squire, of counsel for the Cleveland Railway, quoted in *Aera* for August, 1918, show that in his opinion the Tayler plan is fundamentally unsound. He says: "The Tayler plan, it may be remarked, . . . is in some respects more dangerous than the Johnson 3-cent-fare plan. It is more specious. . . . The company today has sustained a diminution in capital value . . . and is still running behind, although the maximum rate is now in effect."

Turning to Cincinnati, we find that a recent attempt to sell $6,000,000 worth of securities for very necessary capital expenditures resulted in securing a small fraction of that sum through short term notes, just enough to pay maturing obligations and an indebtedness to the city. The defect in the Cincinnati plan is pointed out in the 1919 annual report of the Cleveland Railway, page 16. Referring to a suggested provision similar to the Cincinnati provision of a reward for management increasing with a decreasing fare, the report says: " . . . There would be a great temptation to let the property deteriorate . . . thus impairing the security of the investment of the stockholders . . . permitting service to become unsatisfactory because of poor track and equipment."

An absolutely essential part of a sound financial plan is a reward-for-management feature necessary to attract

capital and its hired man-and-agent management. This reward must be based definitely and logically on results, and not, as in most cases, on compliance with some arbitrary pseudo-scientific standard through which it is hoped that the desired results will be obtained.

It is hopeless to attempt to take into account in any standard of measurement all of the variables which enter into the determination of the efficiency of an operating management. It is, however, possible to establish a reward for management which can only be achieved in its maximum amount through the most intelligent and effective effort.

All present arrangements between cities and street railways seem to ignore the possibility of agreeing on a plan which will allow the company and the city to proceed in accordance with fundamental principles on which the best interests of the city and of the street railways depend. The best interest of the city and car rider requires that quality of service and that price

FORECAST OF ANNUAL RESULTS

From Operation of Reward-for-Management Feature Cost-of-Service Plan

Based on: (1) A reward for management of one-tenth cent per passenger; (2) a reduction in reward per passenger of one per cent for each two per cent increase in passengers above the highest number carried in any preceding year.

Year	Passengers	Reward per Passenger, Cent	Gross Reward
1920	260,000,000	0.1	$260,000
1921	267,000,000	0.0986	263,262
1922	275,000,000	0.0972	267,300
1923	283,000,000	0.0958	271,114
1924	291,000,000	0.0944	274,704
1925	300,000,000	0.093	279,000
1926	309,000,000	0.0916	284.044
1927	318,000,000	0.0902	286,836
1928	328,000,000	0.0888	291,26
1929	338,000,000	0.0874	295,41

which will be attractive to the largest number of car riders. When the largest possible number of car riders has been carried it means that the quality of the service and the price have been most nearly properly adjusted to the demand for service. If the reward to the company is proportioned to the number of passengers carried, its interest in turn will be identical with the car rider's and will furnish the necessary incentive to it to adjust as nearly as possible the quality and price of service to the demand. This leads up to the real basis of my plan to provide the reward for management.

The best method of making this reward effective is to fix the rate of fare so as to provide, in addition to reimbursement for all other expenditures on account of furnishing service, an allowance to the company of a sum of money for each and every passenger carried. This allowance or reward should be a charge against the cost of service and considered as a necessary part of the total cost of capital.

With this reward in view the company will make every effort to provide service which will bring the largest number of car riders. The company's incentive to economy in financial as well as operating management is vital because any additional expense will increase fare, and increased fare will decrease riding.

The effect of such an arrangement on the morale of the operating personnel should be powerful, inasmuch as this plan brings out positively and prominently the fact that the street railway industry is a selling business and that the success of the company depends primarily upon its ability to sell its product—car rides.

The investment of capital to produce more or better service is in the interest of both the company and the car riders only if the cost of such investment will bring a commensurate return in improved service or in operating economy.

Under such an arrangement there should be no objection on the part of the company to allowing the fullest investigation and the control of investment, operations and service.

Some modifications may be advisable in this fundamental plan due to local conditions, although the broader and simpler the arrangement the greater will be the chance of its successful adoption and operation.

Among other modifications it might be advisable for the company to accept a nominal reward per passenger for the ordinary increase in passengers carried due to the growth of the community, and a substantial reward for any traffic in excess of this. There must, however, be some reward for management which keeps abreast of the community in its development.

Allowance to the company per passenger could be proportioned to its success in completing capital investment required by the city. A modification of this kind might be used to harmonize the views of the community and the street railway company if the problem of inadequate facilities is acute.

The allowance to the company per passenger should be reduced (not of course in direct proportion) with an increased volume of business, certainly if the number of passengers carried per dollar invested increases. The allowance could be based on passengers carried per dollar invested, but this seems to introduce unnecessary complications.

An additional incentive to the management to reduce capital costs to a minimum could be provided by increasing the allowance for decreased capital cost per dollar per annum and decreasing the allowance for increased capital cost.

The foregoing provisions are simply possible additions to the plan, and would not affect its operation adversely, but it is not believed that they are necessary to augment the effect of the incentive to the company to improve service and decrease costs in order to sell more rides and increase the gross reward.

A modification of this plan providing a reward large enough to permit a division of the allowance between capital and labor presents attractive features. Such a division of the reward would give a direct incentive to the employee to increase the sale of his product—car rides—and could be regarded as a wage to the employee for his interested effort over and above the amount paid him to cover his bare living expenses. From a similar viewpoint the cost of capital other than the reward for management may be regarded as the bare living expenses of the capital invested, and the additional reward as its wage for its interested effort.

In this connection it may be noted that within reasonable limits the greater the reward for management the higher will be the efficiency of the management possible to secure and the lower the cost of fare due to the greater efficiency.

A diagram showing the disposition of items under this plan is presented herewith, also a statement showing results from its operation based on definite assumptions as to details.

Although this plan of reward for management seems to adapt itself more readily to street railway operations than to other kinds of business, other industries engaged in the production of standardized measurable units can be operated in accordance with the idea.

Car Signs and Motorman's Adjustable Mirror Used in Richmond

THE Virginia Railway & Power Company, Richmond, Va., has, with its first installation of one-man safety cars, adopted the practice of using a "car full" sign when the number of passengers on the car reaches fifty. This gives a standing load of eighteen passengers, which the management thinks is all that can be handled without defeating one of the principal attributes of the car from the public's point of view; namely, high schedule speed.

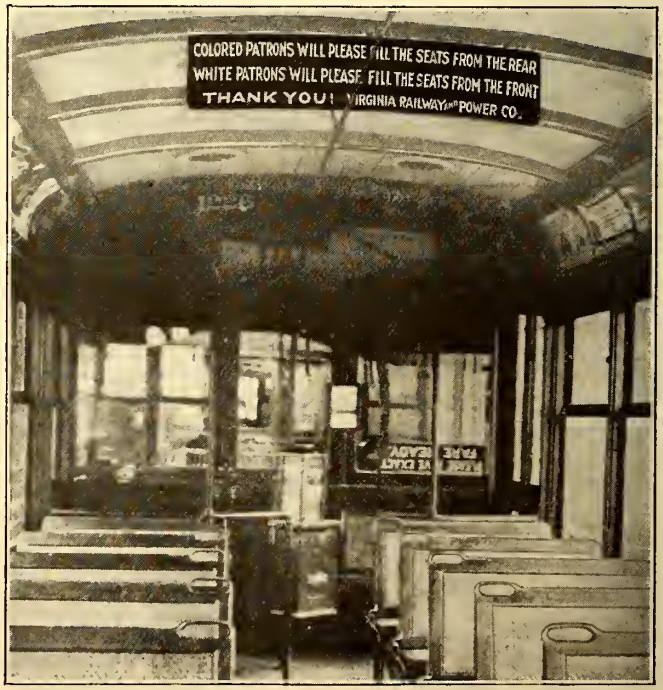
The sign which was developed for this purpose is made reversible, carrying the words "car full" on one side and "please have exact fare ready" on the opposite side. The sign is mounted in a frame made of ¼-in. x 1-in. strap iron which is fastened to the window sill in the right-hand front window. This frame is made in a complete rectangle to give added strength, and the two ends are spot-welded together. The two side pieces of the rectangle are given a one-quarter twist so that the flat side comes against the window sill and is also parallel to the ends of the signboard. The rectangle measures 9 in. x 21⅜ in. inside, and the signboard, 5¼ in. x 21½ in., with letters 3½ in. high on the "car full" side and 1¼ in. high on the reverse side. The sign in this position on the dash is conveniently within the reach of the operator, so that he can quickly change the sign without leaving the car, and with only a step from his operating position. The sign is held in either position about its horizontal axis by a friction catch between the top of the frame and either edge.

Sign Directing Segregation of Passengers

In the picture below showing the interior of the safety car the sign which the Virginia Railway & Power Company uses in directing colored passengers to the proper position in the car is also seen. This is fastened to one of the carlines at about the center of the car, and it reads: "Colored passengers will please fill the seats from the rear. White passengers will please fill the seats from the front. Thank you. Virginia Railway & Power Company."

In this same picture can be seen one of the mirrors which the company has installed on all of its cars. A recent improvement made in this connection has been the mounting of the mirrors to make them adjustable for any motorman, regardless of his height. The mirrors were formerly screwed solidly to the end posts, and this feature brought some complaint from some of the shorter and taller men. To overcome the objections, W. J. Hicks, master mechanic, arranged to mount the mirrors on a ½-in. rod bent in a U-shape with the ends hammered out to take two wood screws for fastening the rods to the posts. This rod is 13 in. long between bends and the mirror is attached to it by two pipe clamps having ¾-in. x 1-in. high loops. A ⅝-in. sash-spring is fastened on the back of the mirror to bear against the rod and hold it in any position in which it is set. A motorman can thus adjust the mirror to suit his height.

CONSTRUCTION DETAILS OF "CAR FULL" SIGN

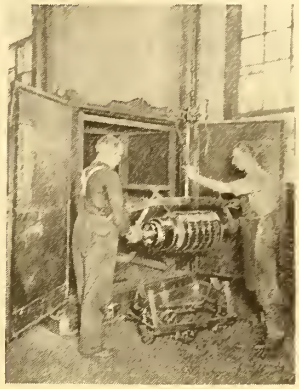


AT LEFT, "CAR FULL" SIGN USED ON RICHMOND (VA.) SAFETY CARS. AT RIGHT, THE REVERSE SIDE OF THE "CAR FULL" SIGN MAY BE SEEN IN THE RIGHT-HAND VESTIBULE WINDOW

The sign directing the segregation of passengers and the adjustable motorman's mirror are also shown.

Shop, Track, Power and Line

These Articles and Ideas Are From Men on the Job Who Find Special Applications and New Methods an Incentive for Greater Effort — If You Have Something Good Pass It Along



Testing Motors After Repair

The Pittsburgh Railways, After a Few Months' Trial of Testing All Motors After Repair and Before Installing, Finds Itself Repaid

SOME form of check upon the work done by the repair department on motor armatures and fields has always been recognized as desirable. It is doubtful, however, if any other road has gone so far in this direction as has the Pittsburgh Railways recently.

This company commenced to test all motors coming from the repair shop about the first of December, 1919. During the month of December 23 per cent of the motors tested were rejected and returned to the repair department for further attention. The month of January showed only 19 per cent returned, while the month of February showed only 15 per cent returned. This three months' record gives a striking indication of the apparent effect upon the quality of work done by the repair shop. Another measure of the effectiveness of this test is indicated by the fact that for the month of February, 1919, thirty-one motors of a particular type had to be changed after they had come from the repair shop and been installed upon cars. This was before the period of testing these motors. In February, 1920, after testing of these motors had started, not more than twelve motor changes were necessary.

For some time the company has had a testing stand so arranged that certain small motors could be dropped into place and run, through gearing, in opposition to a permanently installed interuban motor acting as a generator. Certain intermittent testing was then done upon them. The same or a similar principle has been utilized, but a much improved stand has been erected, as shown in the accompanying illustration. In this case an interurban motor has been mounted upon a sliding base and an easily disconnected coupling has been arranged so that when the motor to be tested is dropped by the crane onto its three-point suspension rack the interurban motor can be moved toward it and the two aligned so that they may work upon the same shaft, thus eliminating the noise and difficulty of gear connection. In addition to this rack the old rack will be replaced with another like the new one, thus giving a two-rack capacity.

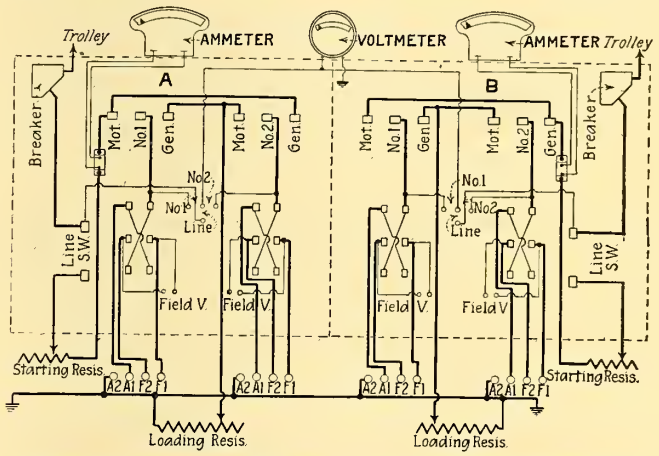
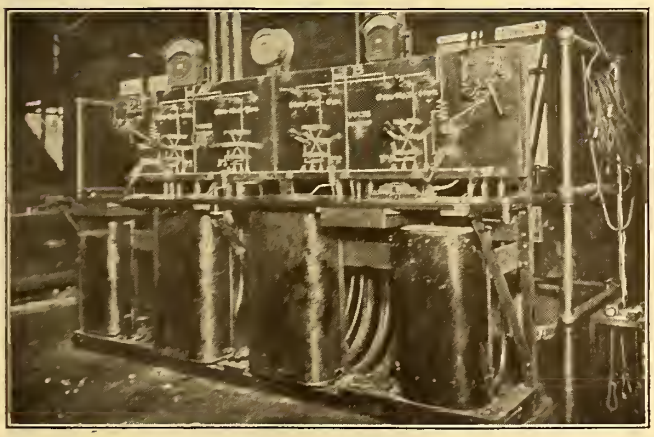
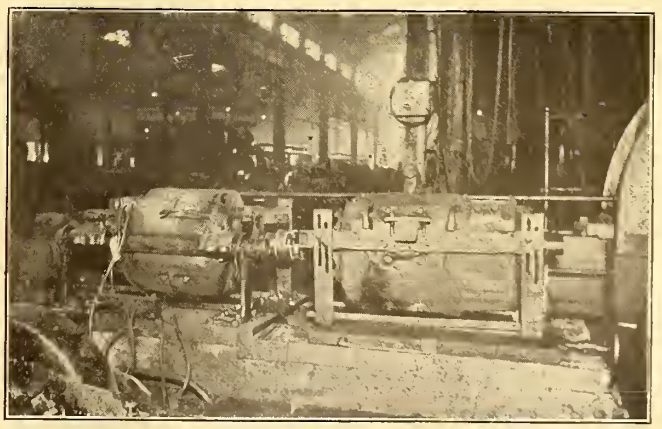


DIAGRAM OF CONNECTIONS OF CONTROL SWITCHBOARD FOR MOTOR TEST

A very complete switchboard and control system has been arranged to take care of this testing. A photograph of the switchboard is shown in an accompanying illustration. A diagram of the circuit on this board is



CONTROL SWITCHBOARD FOR MOTOR TEST



ADJUSTABLE STAND FOR TESTING RAILWAY MOTORS

also reproduced. As indicated, this board is arranged to take care of two racks and gives complete control over both the motor and the generator ends of the combination. The copy of the report form shown herewith indicates the type of test which is made upon the motor. This test might be described as a complete factory test upon the motor with the exception of a heat run. With reference to the heating of the motor, as it takes too long to wait for the motor to come to its maximum temperature so long as it is possible to keep the hand upon the motor without discomfort no heat run is made. In case, however, the bearings seem to get hot, or any other part of the motor seems to heat too rapidly, then a heat run is carefully made

REPORT OF WORK ON TEST FLOOR MONTH OF_____
AT_____SHOPS

TYPE	FRAMES					COMPLETE MOTORS														SUMMARY			
	FIELDS					FIELDS			ARM.		COM.	MECH. DEFECTS											
	GROUNDS	SHORT CIR.	OPEN CIR.	POLARITY	TOTAL ELEC. DEFECTS	GROUNDS	SHORT CIR.	OPEN CIR.	GROUNDS	SHORT CIR.	OPEN CIR.	GROUNDS	SHORT CIR.	HOT BEARINGS	BRUSH HOLDERS LOW	MISC. MECH. DEFECTS	TOTAL MISC. DEFECTS	TOTAL ELEC. DEFECTS	O. K.	TOTAL TESTED	TOTAL DEFECTS	TOTAL O.K.	TOTAL TESTED	PERCENT DEFECTIVE
56																							
57																							
62																							
93																							
247-Cr																							
247-5																							
303																							
306																							
328-5																							
514																							
TOTALS																							

MONTHLY REPORT OF TEST-FLOOR WORK

until the trouble is discovered. The motor is first tested for general defects, tests being made for grounds in both field and armature by applying 2,500 volts for a short period. A 15-minute opposition test is run in both directions under full load. A speed variation of 4 per cent plus and minus is allowed. Another run is made with 150 per cent load for five minutes.

This system of testing has been installed under the direction of F. R. Phillips, superintendent of equipment, and R. F. Bull, engineer of equipment, at the Homewood shop of the company. The Pittsburgh Railways is among the local industries co-operating with the University of Pittsburgh in its co-operative engineering course. Men who are with the company on three months' assignment from this co-operative course are used for the motor testing. These students, who are usually juniors in the course of electrical or mechanical engineering, are very keen to catch any defective motors as they come from the repair shop. The Pittsburgh railways is very well satisfied with the arrangement and anticipates that the future benefit will be even greater than those realized so far.

Rail Hardening Experience in England

AMONG items reported to the London County Council by the highways committee at the meeting held on March 30 information was given as to the result of the Sandberg rail-hardening process, which is used to a considerable extent in Great Britain. It was stated that the effect of the treatment is to raise the elastic limit of the surface of the rail from about 25 tons to more than 100 tons per square inch. Measurements which have been made indicate that the life of rails can be extended more than three years by this process. An absence of corrugation on the treated rails has been noted.

Material Used in Splicing Cables

A List of the Most General Types of Line Cable with Material Used

THE accompanying table gives data on the material required for making either a straight splice, a branch splice or an end bell in each of the different cables listed. This list includes rubber insulated and braided cables, varnished cambric and braided cables, lead and paper, lead and rubber, weatherproof and multi-conductor cables, and the various combinations found in the actual practice are provided for.

A—Straight splice in 500,000 circ. mil rubber insulated and braided cable.
B—Straight splice in 1,000,000 circ.mil rubber insulated and braided copper cable.
C—Straight splice in 2,000,000 circ.mil rubber insulated and braided cable.
D—Straight splice in No. 6 Duplex rubber insulated and braided cable.
E—Straight splice in 500,000 circ. mil varnished cambric and braided cable.
F—Straight splice in 1,000,000 circ.mil varnished cambric and braided cable.
G—Straight splice in 2,000,000 circ mil varnished cambric and braided cable.
H—Straight splice of No. 0000 lead and paper to lead and rubber cable.
I—Straight splice of 500,000 circ. mil lead and paper to 500 000 circ.mil rubber insulated and braided cable.
J—Straight splice of 500,000 circ. mil lead and paper to lead and rubber cable.
K—Straight splice of 1,000,000 circ.mil lead and paper to lead and rubber cable.
L—Straight splice of 2,000,000 circ.mil lead and paper to lead and rubber cable.
M—Straight splice of 1,000,000 circ.mil lead and paper cable to 1,000,000 circ.mil rubber insulated and braided cable.
N—End bell for No. 2 three-conductor high-tension lead and paper cable.
O—End bell for No. 6 three-conductor, high-tension lead and paper cable.
P—End bell for No. 000 three-conductor, paper insulated, high-tension, lead-encased copper cable.
Q—End bell for 250,000 circ.mil three-conductor, high-tension cable.
R—End bell for 350,000 circ.mil three-conductor, high-tension cable.
S—Straight splice in No. 0 triple braided weatherproof insulation.
T—Straight splice in No. 00 triple braided, weatherproof insulation.
U—Straight splice in No. 000 triple braided, weatherproof insulation.
V—Straight splice in No. 0000 triple braided, weatherproof insulation.
W—Straight splice in 250,000 circ. mil triple braided weatherproof insulation.
X—Straight splice in 500,000 circ. mil triple braided, weatherproof insulation.
Y—Straight splice in 1,000,000 circ.mil triple braided, weatherproof insulation.
Z—Straight splice in 2,000,000 circ.mil triple braided, weatherproof insulation.
AA—Straight splice in 500,000 circ.mil lead and paper.
BB—Straight splice in 1,000,000 circ.mil lead and paper cable.
CC—Straight splice in 2,000,000 circ. mil. lead and paper cable.
DD—Straight splice in No. 6 three-conductor lead and paper cable.
EE—Straight splice in 350,000 circ.mil three-conductor, high-tension, paper insulated, lead-encased sector cable.
FF—Straight splice in 250,000 circ.mil three-conductor, high-tension lead and paper cable.
GG—Straight splice in No. 000 conductor, high-tension, paper insulated, lead-encased copper cable.
HH—Straight splice in 2,000,000 circ.mil lead paper and rubber covered cables.
II—Straight splice in No. 2 three-conductor lead and paper cable.
JJ—Straight splice in 500,000 circ. mil submarine cable.
KK—Straight splice in No. 0000 lead and rubber cable.
LL—Straight splice in 500,000 circ.mil lead and rubber cable.
MM—Straight splice in 2,000,000 circ.mil lead and rubber cable.
NN—Straight splice in 1,000,000 circ.mil lead and rubber cable.
OO—Straight splice in No. 6 duplex lead and rubber cable.
PP—Straight splice in 2,500,000 circ.mil cable, one braid.
QQ—Straight splice in 5,000,000 circ.mil cable, one braid.
RR—Straight splice in No. 0 lead and rubber cable.
SS—Straight splice in No. 0000 lead and rubber cable.
TT—Straight splice in No. 1 lead and rubber cable.
UU—Straight splice in No. 4 lead and rubber cable.
VV—Straight splice in No. 0000 rubber, lead and braid cable.
A1—Branch splice on No. 0 rubber and lead cable.
B1—Branch splice on No. 0000 rubber and lead cable.
C1—Branch splice on No. 1 rubber and lead cable.
D1—Branch splice on No. 4 rubber and lead cable.
E1—Branch splice on 250,000 circ. mil rubber and lead cable.
F1—Branch splice on 500,000 circ. mil. rubber and lead cable.
G1—Branch splice on 1,000,000 circ.mil rubber and lead cable.
H1—Branch splice on 2,000,000 circ.mil rubber and lead cable.
I1—Branch splice on No. 2 three-conductor lead and paper cable.
J1—Branch splice on No. 6 three-conductor lead and paper cable.
K1—Branch splice on No. 000, three conductor, high-tension lead and paper cable.
L1—Branch splice on No. 0000, three-conductor, high-tension lead and paper cable.
M1—Branch splice on 350,000 circ. mil three-conductor, high-tension lead and paper cable.
N1—Branch splice on 250,000 circ. mil rubber insulated and braided cable.
O1—Branch splice on 500,000 circ. mil rubber insulated and braided cable.
P1—Branch splice on 1 000,000 circ.mil rubber insulated and braided cable.
Q1—Branch splice on 2,000,000 circ.mil rubber insulated and braided cable.
R1—Branch splice on 500,000 circ. mil varnished cambric and braided cable.
S1—Branch splice on 1,000,000 circ.mil varnished cambric and braided cable.
T1—Branch splice on 2,000,000 circ.mil varnished cambric and braided cable.
U1—Branch splice on 250,000 circ. mil three-conductor, high-tension, paper insulated, lead-encased copper cable.
V1—Branch splice on 1,000,000 circ.mil paper insulated, lead-encased copper cable for trolley side-feed.
W1—Branch splice on 2,000,000 circ.mil paper insulated, lead-encased copper cable.
X1—Branch splice on 250,000 circ. mil varnish cambric and lead cable.
Y1—Branch splice on 500,000 circ. mil varnished cambric and lead cable.
Z1—Branch splice on 1,000,000 circ.mil varnished cambric and lead cable.
A2—Branch splice on 2 000,000 circ.mil varnished cambric and lead cable.

Material Required for Making One Splice in Each of the Cables Listed

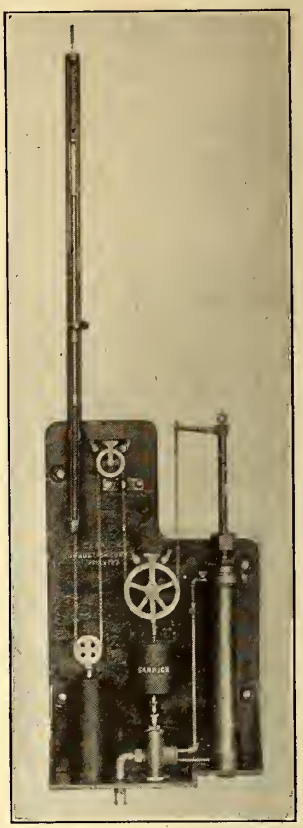
Kind of Cable	Compound No. 227, Pints	Muriatic Acid, Gills	Cheese Cloth, Yds.	Copper Connectors: No. 2	No. 6	No. 1-0	No. 2-0	No. 3-0	No. 4-0	250,000 Cm.	350,000 Cm.	500,000 Cm.	2,000,000 Cm.	Copper Wire No. 10 B. & S. Tinned, Lb.	Kerosene, Qts.	Lead Pipe: Dia., In.	Lgth., In.	Paint, P. & B., Insulating, Pints	Pasters	Sterine Sticks	Tape, Lbs.: Paper, Small	Paper, Large	¾-in. Rubber	1½-in. Friction	Lino, Var. Cambric	Solder, Lbs.: Wiping	½ × ½	End Bell	Insulators for End Bell	Rubber Insulated Cable, Ft.: 350,000 Cm., 11,000 V.	250,000 Cm., 11,000 V.	3-0/11,000 V.	Rubber Covered Wire: No. 2 H.T.	No. 6 H.T.	Insulating Joint
A	½		1											½	2			1		½			2	1		1								
B	½		1											¾	2			1		½			3	2		2								
C			1											1	2			1		½			4	2		3								
D			¼		2										2			1					1½	1		½								
E			½											½	2			2		½			2	1		1								
F			1											¾	2			1		½			2	1	1½	2								
G			1											1	4			1		½			4	2		3								
H	½		¼							1					1	1½	10		4			1			2	¼								
I	2	½	1											½	2	1½-2½	8-12	1	6				2	½	2	¼								
J	½		¼											½	1	2	12		6	¼		2				2½								
K	1		¼											½	2	2½	12		6	¼		2				3								
L	2		½											1	2	3	14		8	¼		3				4								
M			¼											1	2	2-2½	8-12	1		¼		2	½	½		2	¼							
N	4		1	3											4			1	5	½	9	1	1	1		2½		1	3		15			
O	4		1		3										4			1	5	½	9	1	1	1		2½		1	3			15		
P	12							3							4			1	3	½	9	1	1	½		2½		1	3		15			
Q	12		1							3					4			1	5	½	9	1	1	½		2½		1	3		15			
R	6		1								3				4			1	10	1	12	2	1	½		2½		1	3	15				
S		1	¼			1									1					¼				½		½								
T		1	¼				1								1					¼				½		½								
U		1	¼					1							1					¼				½		½								
V		1	¼						1						1					¼				½		½								
W		1	¼							1					1					¼			1	½		½								
X		1	¼											¾	1					¼		2	1			1								
Y		1	½											¾	1			1		¼		4	1½			1½								
Z		2	½											1	2			1		1		6	2			4								
AA	2		1											½	2	2	12		6	½		2				3	¼							
BB	2		1											½	2	2½	12		6	½		2				3	¼							
CC	2		1												2	3	14		10	½		3				3½	¼							
DD	4		1		3										2	3	20		8		9	2				4	¼							
EE	8		1								3				4	4	20		10	½	12	3				5	¼							
FF	8		1							3					4	4	20		10	½	10	3				5	¼							
GG	8		1					3							4	4	20		10	½	9	3				5	¼							
HH	2		1												2	3-2½	8-14	1	10	½		3	2	1		4	¼							
II	4		1	3											2	3	20		8		9	2				4	¼							
JJ	1		¼											½	2	2	12		6				1½	1		3								
KK									1						2	2	10	2	5				1			2½								
LL	2		1											½	2	2½	12		10	½			1			3	¼							
MM	2		1												4	3	14		10	½			2			4	¼							
NN	2		1											½	2	2½	12		10	½			1			3	¼							
OO			¼		2										2	2½	12	1	6				1	½		2								
PP		2	1											1	4			1		1				1		5								
QQ		4	1										1	2	4			1		1				1		10								
RR	½		¼												1	1½	10		4	¼				½		2								
SS	½		¼							1					1	1½	10		4	¼				½		2								
TT	½		¼												1	1½	10		4	¼				½		2								
UU	¼		¼												1	1½	10		4	¼				½		2								
VV	1		¼						1						1	2	12		6					½		2								
A1	½		¼					1							1	2	12		6	¼				½		3								
B1	½		¼						1						1	2	12		6	¼				¾		3								
C1	¼		¼					1							1	1½	12		6	¼				½		2½								
D1	¼		¼	1											1	1½	12		6	¼				½		2½								
E1	2	2	1								1				4	1½-3	14-16	1	10	½			2	1		4	¼							
F1	2	2	1											1	4	1½-3½	24-14	1	10	½			2	1		5	¼							
G1	4		1											1½	4	1½-4	16-16	1	10	1		2	2	1		6	¼							
H1	4		1											1½	4	2-4½	16-16	1	10	1		3	2	1		7	¼							
I1	10		1½					3							6	4½	22		10	1	9	4			1	6	¼							
J1	8		1½	3											6	4½	22		10	½	9	4			1	6	¼							
K1	10		1½								3				6	5	22		10	1	12	5			1	8	¼							
L1	10		1½								3				6	5	22		10	1	12	5			1	8	¼							
M1	20		2									3			8	6	24		15	1	15	6	1		1	10	¼							
N1			¼												1			½		¼			1	½		2								
O1			¼												1					¼			1½	1		2½								
P1			½											1	1			1		¼			3	½		3½								
Q1			½											1½	1½			1		¼			4	2		4								
R1			1											1	4			1		¼			4	2		2								
S1			1											1½	4			1		¼			4	2		2								
T1			1½											1½	4			2		½			6	3		3								
U1	16		2									3			8	5	24		15	1	12	6	1		1	10	¼							
V1	2		1											1½	4	3½	14		7	½		3				5								1
W1	6		1											1½	4	4½	16		10	1		4			1	8	½							
X1	2		1								1				4	1½-3	16-14	1	10	½			2	1		4	¼							
Y1	2		1											1	4	1½-3½	24-14	1	10	½				1	¼	5	¼							
Z1	4		1											1½	4	1½-4	16-16	1	10	1		2		1	½	6	¼							
A2	4		1											1½	4	2-4½	16-16	1	10	1		3	2	1	½	7	¼							

Automatic Control of Furnaces

An Automatic Regulating System for the Graduated Control of Fuel Feed, Damper Position and Air

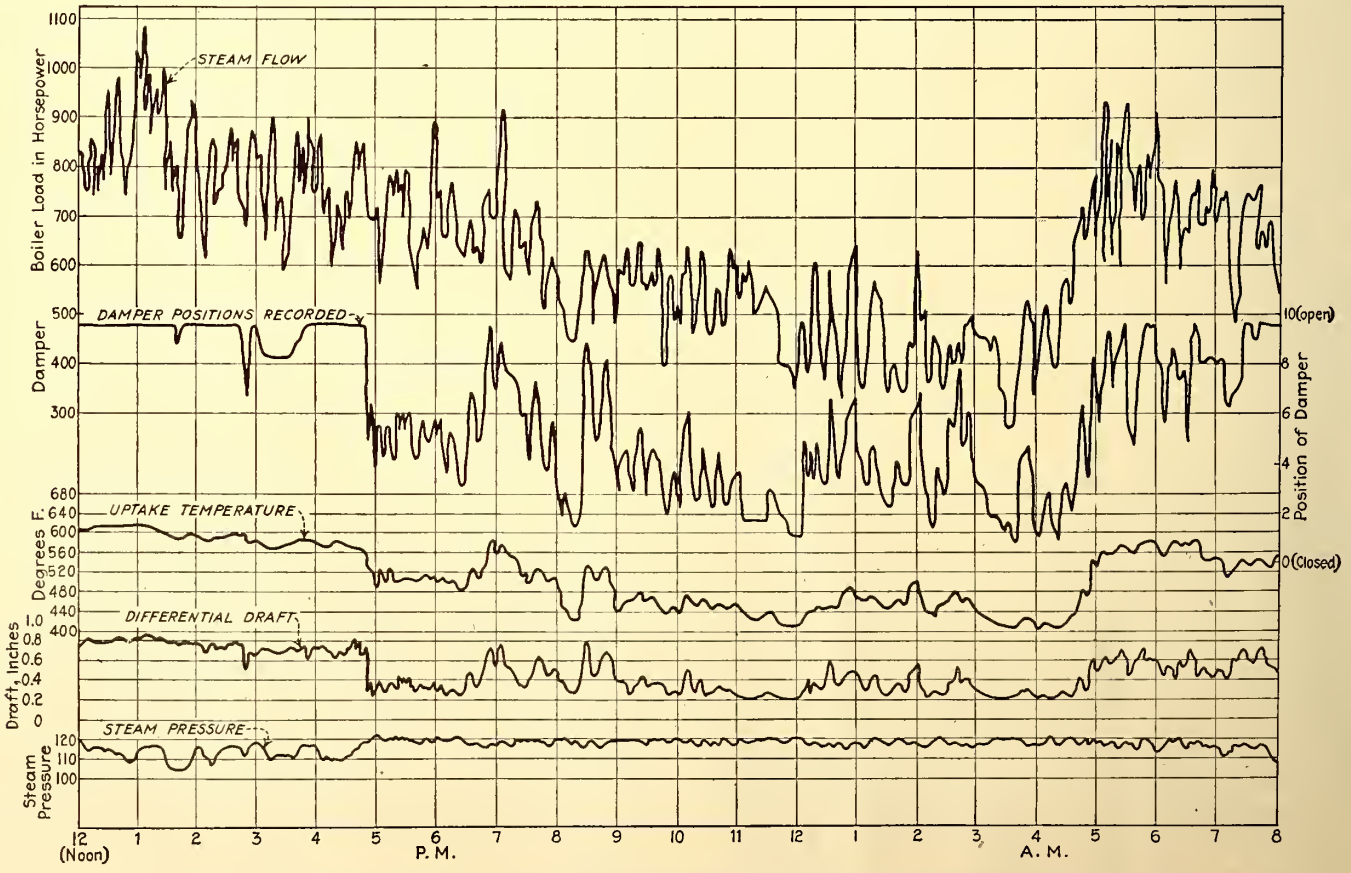
AN AUTOMATIC system of controlling the combustion in a furnace which is so designed as to make possible the maintenance of the most efficient operation under the varying conditions of load and fuel has been developed by the Carrick Engineering Company, Chicago. This system has been developed to overcome some of the weakness of hand control, which, as is commonly known, cannot be adjusted frequently or accurately enough to provide the proper setting for slightly varying conditions. Changes in the damper position and rate of fuel feed and speed of motors in forced or induced draft systems, as made by hand, take into account only the rather large variations, so that there are periods between the changes in settings when conditions may be rather widely different from those which would secure most efficient combustion. The automatic system which the Carrick company has developed is so designed, it is claimed, that the changes in setting of damper, speed of fuel feed, etc., take place gradually and simultaneously with slight changes in steam pressure in the boiler, which may be due to variation of the load or condition of the furnace or coal.

This new automatic regulating system consists of a master control having a barometric column of mercury which is actuated by the steam pressure in the boiler. The height of the mercury column varies 2 in. for every pound of steam pressure changes. A mercury reservoir, shown in the left-hand corner of the diagrammatic drawing of the Carrick system, on page 1007, is connected with an upper mercury cylinder or well by a pipe line. A free-moving piston in this upper well is connected by a cable to the arm of the hydraulic cylinder, shown at the right of the control panel. The chain connection between the floating plunger yoke and the hydraulic piston passes around the floating wheel or valve gear, shown at the center of the panel. Just below this wheel is a four-way pilot valve which controls the flow of water from the city pressure either to the top or bottom of the hydraulic cylinder, depending upon whether the steam pressure rises or falls, thus raising or lowering the piston of the valve. This hydraulic piston cannot move until the four-way pilot valve is opened.



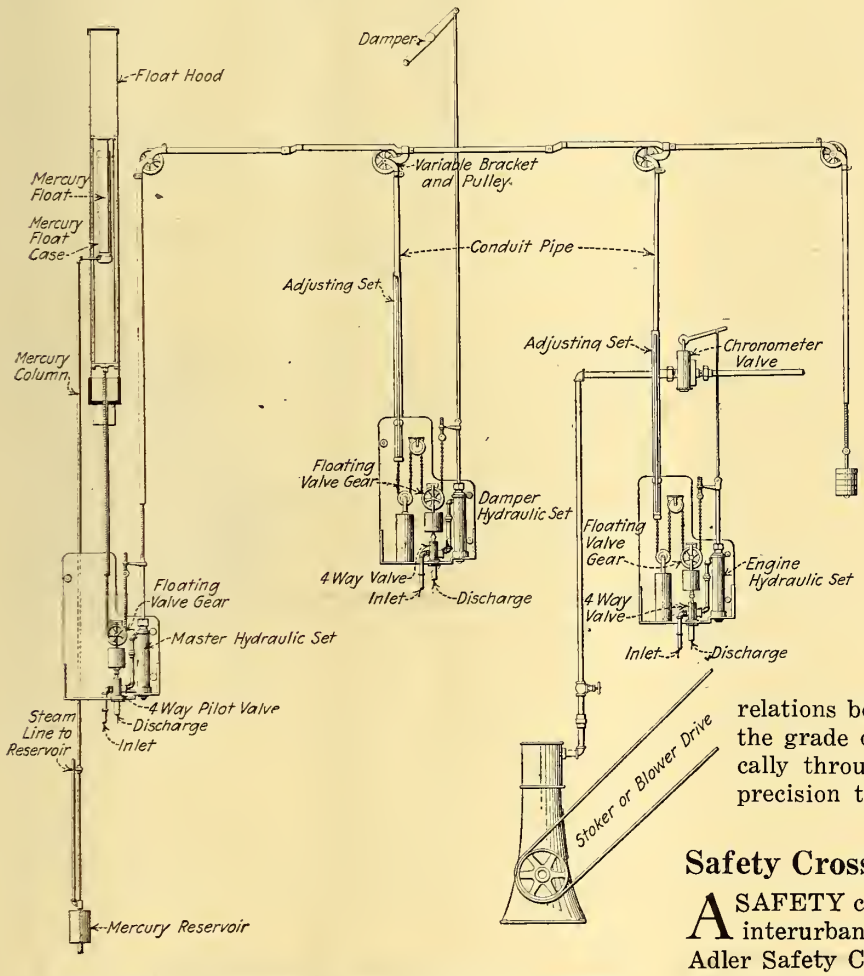
A TYPICAL AUXILIARY CONTROL PANEL

When a change in the steam pressure takes place there is a corresponding change in the mercury level in the upper well and the plunger therein travels accordingly. This causes the wheel lever to raise or lower and at the same time



A RECORD OF THE OPERATING RESULTS PRODUCED BY THE AUTOMATIC CONTROL WITH A 500-HP. WATER-TUBE BOILER

turn slightly, whereupon the valve gear and the pilot valve piston are raised or lowered, since the hydraulic balancing pressure must remain constant until the above changes have taken place. As soon as the piston of the pilot valve is raised or lowered water from the city mains is admitted to the top or bottom of the hydraulic cylinder, causing the piston to move upward or downward, restoring the position of the wheel lever and automatically returning the piston of the pilot valve to a neutral or closed position. The neutral position is attained as soon as the hydraulic piston travels downward or upward as far as the mercury plunger traveled upward or downward, or in other words as soon as the hydraulic pressure is balanced



DIAGRAMMATIC DRAWING OF AUTOMATIC CONTROL SYSTEM SHOWING MASTER AND AUXILIARY CONTROLS

against the steam pressure on the mercury. When this balance takes place the master control holds that position until there is another change in pressure.

The operation of the master control is transmitted to the individual auxiliaries, there being one auxiliary control for each damper, stoker engine or motor, forced-draft fan, etc. The auxiliaries are all connected to the master control by a strong tiller cable or chain, and the connections are run through conduit pipes with special pulleys so constructed as to make possible a turn through any angle. An interesting feature of the graduated control is that each auxiliary may be so adjusted one boiler may be set ahead or back of the others and the load carried on a certain number of boilers up to a predetermined rating, when the others can be cut into service automatically and at any rate desired.

Where engines or turbines are used for driving stokers or fans a special chronometer valve is employed. This is designed to supply steam under graduated control. In general, the valve is of the vertical piston type with a rectangular opening through the piston and a corresponding rectangular port in the body of the valve. The length of stroke of the piston is determined by the auxiliary control, so that the flow of steam to the stoker or fan engine is varied to correspond with the requirements. There is also provision for micrometer hand adjustments which permit of turning the piston of the valve to vary the width of the port to suit the requirements of any particular machine. An accompanying illustration on page 1006 shows the comparative record taken on a 500-hp. water-tube boiler during consecutive hours of the operation as controlled by the automatic system. The load chart is shown at the top and the damper position just below. The other simultaneous readings plotted on the chart are the uptake temperature, differential draft and steam pressure. It will be noted that at 7 p.m. with a load of 900 hp. the damper was nearly wide open. From then until 8:30 p.m. the load diminished and the damper position changed correspondingly. Also, between 4 and 5 o'clock the next morning the load gradually increased, and again the damper changed its position, gradually opening up until the peak was reached, showing how the damper is maintained in the correct position to supply the proper draft and produce the rate of combustion necessary to carry the load efficiently. The feed of the stoker had been increased in the same proportion, so that the efficient relations between draft and fuel bed established for the grade of coal burned was maintained automatically throughout the period and with much closer precision than is possible with hand regulation.

Safety Crossing Signal for Interurban Lines

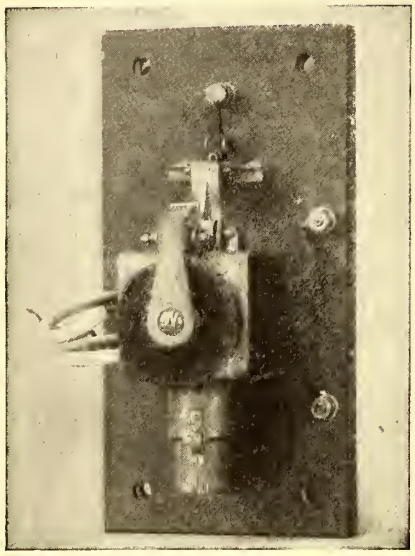
A SAFETY crossing signal adapted for use on electric interurban lines is being marketed by the Charles Adler Safety Crossing Signal Company, Baltimore, Md. This signal system is a combination of an audible alarm placed at the crossing to warn vehicles of the approach of a car and a visual side signal to indicate to the motorman of an approaching car whether or not the bell at the crossing is operating. If the signal system is out of order the bell does not ring, but its failure is signaled to the motorman, so that he will be aware that he is approaching an unprotected crossing and can regulate his speed to safe limits. The signal operates in conjunction with an open-track circuit from the trolley in conjunction with a relay. This relay is designed to give positive action with a very small current, and current is used only while the trolley wheels pass the trolley contact. The relay is so designed that the armatures when once moved will remain in position without the necessity of an energizing magnet to hold them.

Among the advantages claimed are that when out of order it causes no inconvenience to nearby residents by continued ringing and its maintenance cost is low.

New Relay for Direct-Current Circuit

A NEW relay, known as type KN, is now being manufactured by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. It may be used either as a signal relay or as a trip-free relay.

When used as a signal relay it operates an audible or visible signal to notify the attendants that a circuit breaker has been tripped automatically. The contacts of the relay are normally held latched in the open position. In operating, this latch is released by a coil in series with the circuit breaker trip coil and is reset by a coil connected across the control circuit. The contacts will remain closed until the circuit of the reset coil is energized by means of a push button. The signal is actuated only when the tripping is done by automatic devices and does not operate when a circuit breaker is opened manually.

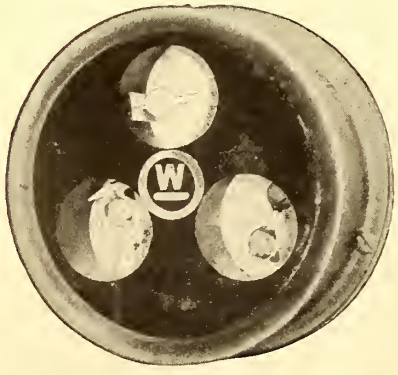


NEW DIRECT-CURRENT RELAY

When used as a trip-free relay it prevents the holding in of an electrically operated device, such as a circuit breaker, while an abnormal condition exists on the circuit. When the circuit breaker is opened automatically the circuit breaker closing circuit is also opened. When the trouble has been removed from the lines the controller is moved to the trip position, thus resetting the trip-free relay and closing the circuit breaker closing circuit.

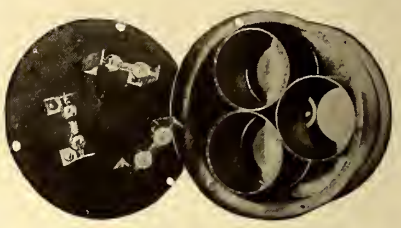
Vacuum Tube Type Electrostatic Glow Meter

INDICATION of potential, ground detection and synchronism are the three uses to which a recently developed electrostatic glow meter can be placed. This device is manufactured by the Westinghouse Electric & Manufacturing Company and consists essentially of three vacuum tubes. When used as a ground detector or potential indicator the device is connected so that one of the bulbs is in parallel with the bottom section of each of the three insulator columns. When used for synchronizing between a bus and a line or between two lines or two buses the glow meter is connected as follows: The phase connections through one of the bulbs are made such that it will not glow at synchronism. The phases of the two lower bulbs are crossed so that they will glow a half brilliancy at synchronism. When out of synchronism there will be an apparent rotation, which will be an indication as to whether the incoming line is fast or slow.



ELECTROSTATIC GLOW METER

For switching these instruments small oil switches may be used so that it is possible to use one glow meter for a number of purposes; that is, if enough oil switches are provided.

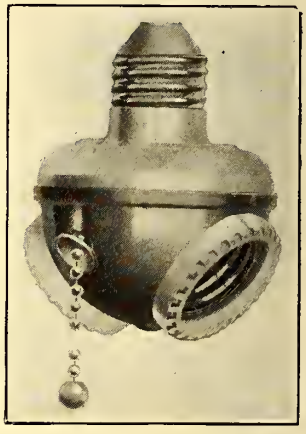


ELECTROSTATIC GLOW METER WITH COVER REMOVED

The base on which the apparatus is mounted is of micarta insulation. The small bulbs are filled with a rare gas which has the property of giving forth a vivid orange-red glow on an extremely small static discharge. They are mounted on spring clips and are separated from each other by micarta tubing.

Two-Way Pull Plug for Shop and Other Uses

THE Benjamin Electric Manufacturing Company of Chicago, Ill., has just brought out a pull plug which is a development of its No. 92 two-way plug. This has been on the market for several years. In addition to providing the convenience of two outlets, the pull-chain mechanism controls one of the outlets so that this lamp can be turned off independently. This should prove a convenient fixture in shops where it is necessary to have a drop light close to the work in addition to another light for general lighting purposes. The pull chain attachment also enables this plug to be used in such locations where different intensities of light are necessary.



TWO-WAY PLUG FOR SHOP USES

Fatty Acids in Lubricants

AT THE meeting of the National Petroleum Association, held at Pittsburgh, Pa., on April 22, a paper was read by H. M. Wells and James E. Southcombe on "The Theory and Practice of Lubrication." This paper was designed to explain the principles involved in the "germ" process of lubricating oils, which is said to have been tried out on a considerable scale in Great Britain. "Germ process" oil is made by a patented process, and it is intended for use in small proportion in mineral oil to give the quality of "slipperiness," which the authors of the paper attribute to low-surface tension.

In the paper experiments are described which demonstrate that the frictional resistance shown by any mineral oil can be definitely reduced by the addition of about 1 per cent of commercial fatty acids. The frictional coefficient of a pure mineral oil is said to be lowered by at least 25 per cent by such mixture without danger of serious corrosion of lubricated surfaces.

Association News

Claims Work Well Under Way

ON MAY 11 S. B. Hare, president of the Claims Association, held a conference at association headquarters with several committee chairmen and outlined the work to be covered prior to the convention. The result of the conference was briefly as follows:

The committee on constitution and by-laws is to harmonize the constitution of the Claims Association with respect to the changes that have been made in the past in the rules of the American Association, especially the provisions regarding membership.

The committee on interchange of claims statistics is to prepare for issuance by Secretary Burritt a questionnaire covering claims department costs. The working up of this information, when collected for comparative purposes, so that it will be available for member companies will also fall to this committee. The detailed tabulating work, however, will be done at the association office.

The committee on membership plans a campaign to increase enthusiasm among claims officials in the work of the association. The lack of this at present is reflected in the small number of individual members. The committee hopes that by waging a vigorous campaign for a larger attendance at convention meetings, together with personal effort on the part of all present members to reflect the benefits derived in the past from association work, a greater association interest can be aroused. This should develop new ideas not heretofore brought out that should prove of material advantage to all members.

Claims Association Committees

THE complete list of Claims Association committees appointed to report at the 1920 convention in October is as follows:

Safety Committee: R. E. McDougall, New York & Harlem Traction Lines, chairman; C. G. Rice, Pittsburg (Pa.) Railways; W. F. Weh, Cleveland (Ohio) Railway; H. V. Drown, Public Service Railway, Newark, N. J.; H. K. Bennett, Eastern Massachusetts Street Railway, Boston.

Committee on Resolutions: A. G. Jack, Wilmington & Philadelphia Traction Company, Chester, Pa., chairman; C. A. Glawson, Macon (Ga.) Railway & Light Company; H. O. Allison, Beaver Valley Traction Company, New Brighton, Pa.

Committee on Ways and Means: J. S. Harrison, Jacksonville (Fla.) Traction Company, chairman; S. J. Herrell, Knoxville (Tenn.) Railway & Light Company; H. L. Arden, Northern Ohio Traction & Light Company, Akron, Ohio.

Committee on Subjects: J. S. Kubu, New York State Railways, Utica, N. Y., chairman; Claude D. Davis, Columbia (S. C.) Railway, Gas & Light Company; W. G. Fitzpatrick, Detroit (Mich.) United Railways; L. F. Wynne, George Railway & Power Company, Atlanta.

Committee on Interchange of Claims Statistics: H. D. Briggs, Public Service Railway, chairman; W. F. Weh, Cleveland Railway; J. S. Kubu, New York State Railways, Utica, N. Y.

Committee on Constitution and By-Laws: H. K. Bennett, Eastern Massachusetts Street Railway, chairman; W. F. Weh, Cleveland Railway.

Committee on Membership: C. G. Rice, Pittsburgh Railways, chairman; Wallace Muir, Kentucky Traction & Terminal Company, Lexington, Ky.; W. A. Tichenor, Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.

Equipment Committee Meets

THE equipment committee of the Engineering Association held a general meeting at association headquarters on May 7. Several of the sub-committees met May 6 to prepare material for presentation at the general meeting. Those in attendance were: Daniel Durie, West Penn Railways, chairman; R. H. Dalgleish, Capital Traction Company; James C. C. Holding, Midvale Steel & Ordnance Company; E. D. Priest, General Electric Company; F. W. Sargent, American Brake Shoe & Foundry Company; K. A. Simmon, Westinghouse Electric & Manufacturing Company; C. W. Squier, ELECTRIC RAILWAY JOURNAL, and J. W. Welsh, special engineer of the association.

There was considerable discussion in regard to motor failures which occurred on roads operating in New England during the recent severe winter. Several definite suggestions were outlined for reducing troubles under these conditions and for producing more reliable equipment. The replies which have been received to the questionnaires regarding the life of wearing parts and equipment failures due to severe weather conditions were gone over at considerable length, and plans for summarizing these so that definite conclusions could be drawn were decided upon.

The sub-committee having charge of the standardization of railway motor parts decided to have a meeting at the works of the General Electric Company, Schenectady, N. Y., on May 18. It was considered particularly important that all the railway members of the committee make a special effort to attend. An earnest endeavor will be made on the part of all the various sub-committees to finish their work this month, so that final reports and recommendations can be made at the next meeting of the committee on equipment, which will be held June 3 and 4 at association headquarters.

Simon Lake of Submarine Boat Fame Addresses Company Section

THE principal speaker at the dinner meeting of the Connecticut Company Section held on May 6, at Bridgeport, was Simon Lake, eminent through his inventions in the field of submarine boat design and construction. Mr. Lake's topic was "The Commercial Submarine," but he also discussed briefly the military submarine. In his lecture, as he has done consistently heretofore, Mr. Lake defined the legitimate scope of the military submarine as coast defense. For this purpose, he said, it will be a necessity for a long time to come. The commercial submarine, as he is now actively developing it, is not primarily for the transportation of goods, although he sees a great future for it in this field. For the present the primary purpose is in salvaging wrecked vessels and their cargoes and in gathering the natural treasures to be found on the beds of the oceans and other bodies of water. Mr. Lake also sees an opportunity for the submarine in Arctic exploration,

as this type of boat lends itself well to travel under ice, its framework being lightly in contact with the smooth undersurface of the ice. He believed that goods can be transported in this way, also, in a few bodies of water which are closed by ice through a large part of the year.

Other speakers were S. B. Price, secretary of the Chamber of Commerce, who represented the Mayor; Philip A. Atwater, treasurer of the Columbia Lock Nut & Bolt Company and president of the Kiwanis Club, and J. S. Goodwin, local manager, and W. J. Flickinger, assistant to the president, the Connecticut Company. Chairman W. R. Dunham, Jr., turned the meeting over to Mr. Goodwin, who presided while the addresses were being made and a varied entertainment program was being given.

An interesting feature of the meeting was a brief description by Mr. Flickinger of the new zone system, scheduled to be put into effect on May 9. He solicited the co-operation of the members of the section in selling commutation tickets and otherwise making the new system a success.

Letters to the Editors

Automatic Substation Savings

OMAHA & COUNCIL BLUFFS STREET RAILWAY
OMAHA, NEB., April 14, 1920.

To the Editors:

In the article in the March 13, 1920, issue of the ELECTRIC RAILWAY JOURNAL on "Automatic Substations for Heavy City Service," by R. J. Wensley, I note that originally there were two power stations in the example discussed and, according to the proposed plan, one was to be abandoned and sold for scrap.

The power house that is to be abandoned contained 8,000 kw. in direct-current generating machinery for which a credit of $100,000 was taken as scrap value. This 8,000 kw. will have to be replaced by installing 8,000 kw. in alternating-current generating machinery and sufficient boiler capacity in the plant that is to remain. If the old boilers were used from the scrapped plant in the other plant, the additional expense of moving and erecting the boilers, the purchase of new turbines and condensers and the building of an addition to the power-house building would amount to about $100 per kilowatt.

The cost of 8,000 kw. in new power-house equipment would then be in the neighborhood of $800,000, instead of the $100,000 as allowed in Mr. Wensley's Table II. Table II would then read as follows:

GROSS COST OF THE NEW SYSTEM

11,500 kw. of substations at $40		$460,000
25 miles of line at $5,000.		125,000
Reconstruction of feeder system		25,000
Power-house equipment, turbine, generator, foundations, building, etc.		800,000
Total cost of automatic substations		$1,410,000
Credit power plant scrap.	$100,000	
Credit for copper removed	205,380	305,380
Net cost of automatic substations		$1,104,620
Fixed charges at 15 per cent on net cost		165,693
Annual operating labor		7,000
Gross annual charges against automatics		$172,693

ANNUAL EXPENDITURE DUE TO NEW EQUIPMENT

Annual saving in copper loss	$66,000
Annual saving in platform labor	14,600
Annual saving in shutting down old plant	50,000
	$130,600
Annual cost of substations	172,693
Annual expenditure due to new equipment	130,600
Deficiency annually	$42,093

This would leave a deficiency of $42,093 annually, instead of $47,970 credit, as shown.

I should like to hear from other engineers on this subject.

W. O. JACOBI,
Superintendent Electric Line.

[The above letter was submitted to Mr. Wensley for his comment. Mr. Wensley has replied as below.—EDS.]

WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY
EAST PITTSBURGH, PA., May 5, 1920.

To the Editors:

I have your letter enclosing a copy of one submitted by W. O. Jacobi for publication in the ELECTRIC RAILWAY JOURNAL, in which Mr. Jacobi comments on the paper which I presented before the American Institute of Electrical Engineers on March 12. In reply to the points raised by Mr. Jacobi, I would state as follows:

If new power-house equipment had to be purchased to take the place of the 8,000 kw. in the old direct-current generating equipment in the case which I cited, then Mr. Jacobi's comments undoubtedly would be correct. The figures that were given in the Institute paper, however, had to do with a specific case and were the figures worked up for use on a particular job. On this particular job it is unnecessary to purchase new generating equipment since, at the time the new power station was built, complete generation was installed to take care of this load. The figures as given, therefore, represent the money which the traction company actually will have to spend at this time in making the change to automatic substation operation.

There is no question at all but that if the proposition was being analyzed as an entirely new one the additional annual charge of the power-plant equipment should be assessed against the operation of the railway. Under the conditions, however, which had to do with an actual case and with real money which must be spent at the present time and not with investment previously made which may be used in the reconstruction, I feel that the figures as given in the Institute paper are correct.

R. J. WENSLEY,
Switchboard Engineering Department.

Two More Large Turbines

THE United Electric Light & Power Company, New York City, one of whose large customers is the New Haven Railroad, will soon install two Westinghouse turbine-generators which will have a capacity of 35,000 kw. or a short-period peak-load capacity of 40,000 kw. These will be of the tandem-compound type, somewhat similar to the units installed in the Northwest Station of the Commonwealth Edison Company, Chicago, Ill. They will operate at 1,200 r.p.m., producing three-phase current at 13,200 volts, 60 cycles. The turbines will be designed for 220 lb. steam pressure, 200 deg. F. superheat and 29 in. vacuum. They will have reaction blading throughout. The high-pressure element will be single-flow and the low-pressure element double-flow.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Franchise Vote Soon

Houston Service - at - Cost Measure Being Prepared for Submission to Voters

The new franchise for the Houston (Tex.) Electric Company, embodying the service-at-cost feature and patterned somewhat after the franchise granted the Dallas Railway in 1917, has finally been completed by city officials and representatives of the company. After submission to the expansion board of the city of Houston for its approval, the proposed franchise will be placed before the voters for their approval at a referendum election to be called for that purpose. The franchise does not in any way affect the Galveston - Houston Interurban, its schedules, fares or method of operation.

City Has Right to Purchase

Under the proposed franchise the city of Houston has the right to purchase the entire plant of the company, but not any part of it, at any time it may desire to exercise such option, at the agreed valuation of $6,000,000 plus amounts credited for betterments and improvements.

A sliding scale of fares is provided. When the fare regulating fund, $40,000, becomes 40 per cent above normal, the fares are to be reduced in accordance with the schedule; if the fund should reach 40 per cent below normal then the company will be allowed to raise fares to the next step indicated.

The valuation of the company's holdings will remain at $6,000,000, the figure set by the federal court on March 13. On this amount the company will be allowed 8 per cent per annum as a fair rate of return.

A board is provided by the proposed franchise, called the board of control, consisting of four members, two representing the city and two the company, the Mayor being one of the city's representatives by virtue of his office and chairman of the board, the other member of the board representing the city to be appointed by the Mayor and approved by the City Council.

Service Regulations with City

In the event the board fails to agree on any problem it then has the power to select a fifth member by a majority vote. In case it cannot make such a selection within five days then the matter will be decided by the district judges in Harris County, they selecting the fifth member by a majority vote.

The power to regulate the quality and quantity of service is to remain with the City Council and the requirement of the extension of lines unless it can be shown by the company that such an extension would interfere with the earning of a fair rate of interest; in that case if the citizens of the community wish the extension and are willing to pay for it by increased fares to that section then it will be made by the company.

$1,000,000 for Improvements

Considering the acceptance of the franchise by the company to be ample compensation for the passage, the city only requires that the company pay it $500 on Jan. 1, 1921, and on the first of the year after that.

In case the company does not render the service to which the public is entitled, the city has the right to enforce the obligation by mandamus or to forfeit the franchise by judicial proceedings.

The franchise states that the company has filed a list of expenditures that is proposed for the improvement of the property estimated at $1,000,000, and says that by the filing of such an article the company has bound itself to carry out such improvements.

Electric Railway Men Not Subject to Eight-Hour Statute

A decision which in effect holds that electric and interurban railroads do not come under the provisions of the Adamson eight-hour act was rendered recently at Sacramento, Cal., by Judge William C. Van Fleet, in the United States District Court.

The case was styled J. E. Williamson vs. Northern Electric Railroad (since changed to the Sacramento Northern) and was a test case, by which Mr. Williamson, as a former employee of the line, sought to compel the payment of wages claimed to be due him as between the ten-hour and the eight-hour basis, and covering the period since Jan. 1, 1917, when the act went into effect.

Judge Van Fleet ruled that Williams in the first place, as an employee of the electric railroad, did not come under the act for the reason he was not engaged in the handling of interstate commerce.

In the second place, the Judge held that since the plaintiff had accepted receipts with the clause "in full settlement of all demands to date" he was barred from again coming back to the corporation and asking for more pay. The court ruled that this would bar the collection of additional wages regardless of any act.

New York Arbitrators Meet

Adjustment of Wages in Rochester, Syracuse and Utica Before Board for Settlement

The first step toward bringing about an adjustment in the matter of wages between the New York State Railways and its organized employees in Rochester, Syracuse and Utica was taken at Syracuse on May 12, when B. E. Tilton, vice-president and general manager of the New York State Railways, named by President James F. Hamilton to represent the company in the arbitration proceedings, met with James H. Vahey, Boston, for the purpose of choosing a third party to take part in the proceeding.

Union Selects Its Counsel

Mr. Vahey was the choice of the men as their representative. He is the general counsel for the Amalgamated Association. The selection of the third man may prove very difficult owing to the fact that it is expected the choice of one side will not correspond to the desires of the other, while those that would be viewed with favor by both parties to the dispute will likely refuse to serve.

The sections of the proposed labor contract on which the company and men do not agree and which the arbitration will finally decide are as follows:

Sec. 2. The hours of labor and weekly working period for motormen and conductors.

Sec. 19. Providing for flagmen and crossing tenders and their wages.

Sec. 22. Providing for Sunday work for motormen and conductors who have no regular Sunday work day and are called back to work on that day.

Sec. 27. Providing for the wages of motormen and conductors.

Sec. 31. Which has been combined with Section 37, which is to provide for motormen and conductors who hold city runs and are asked to do extra work on the third rail; also providing for the hours of labor and wages of men in express and baggage work.

Sec. 39. Providing the minimum pay for express and baggage men when required to report.

Sec. 2 of the Oneida Supplement, which covers wages of motormen and conductors on the Oneida Line.

The hours and wages of the employees as requested in the Oneida Supplement of the agreement, which provides for a differential for motormen and conductors on this line.

Wages and Hours General Subject

It was agreed that the arbitrators should consider the wages and hours and make an award thereon covering all sections in the agreement whether specifically mentioned herein or not.

It was previously stated that there would be nine arbitrators in a Utica report. This was erroneous.

Detroit's Extension Program Halted

Plans of City Administration Demand Removal from Detroit United Railway of Authority to Build More Track

Construction activities by workmen employed by the Detroit (Mich.) United Railway on the Harper Avenue extension were stopped only after John Kerwin, superintendent of the company's track department, had been placed under arrest. This action was taken after Corporation Counsel Wilcox had informed members of the Council that the plans of the administration demanded the removal from the company of all authority to build more track. The preventing of further track construction in the city by the Detroit United Railway was declared a part of the Mayor's plan and the Council indefinitely postponed the reconsideration of the vote by which the resolutions were adopted rescinding authority to the company to build extensions.

COUNCILMAN KRONK, the only member to vote against the postponement of the resolution to reconsider revoking the company's right to build extensions, stated that in his opinion the people did not intend to stop railway construction when they approved the Mayor's plan on April 5. He maintained that the people had the impression that the plan approved would double the activities in the matter of railway extensions. He also maintained that the company could put the lines in operation and then if long drawn out litigation proved necessary, the people, in the interim, would have the additional transportation facilities. In the meantime additional lines could be built by the city so that eventually a system would be developed that would serve all the people.

The president of the Council cited that inasmuch as the Corporation Counsel indicated that full responsibility for any action that was part of its street railway plan must be assumed by the administration, it was not the province of the Council to hinder in any way the development of the Mayor's plan by which he had pledged to improve the city's transportation facilities.

Police Disperse Workers

The technical point upon which action of the city officials was based in stopping work on Harper Avenue was the failure on the part of the company to obtain a permit from the Department of Public Works for work in the street. In 1917 a Council resolution was passed instructing the Detroit United Railway to double track Harper Avenue, which was then provided with a single track built on the north side of the street under an old county grant to the Rapid Railway before the territory was included in the city.

When the Mayor's secretary and the Corporation Counsel visited the site and found about fifty men at work excavating in the middle of the street for a double track foundation they reported to the Mayor and were instructed to have the Commissioner of Public Works stop the work if no permit had been issued. With a small squad of policemen it was attempted to stop the workmen, but results were ineffectual, for while part of the construction gang were being ordered out of one end of the trench others would return to work at the other end. After reinforcements had been hurriedly summoned from police headquarters, about forty policemen cleared the trench. After Superintendent Kerwin's arrest and his telephone conference with officials of the railway, the workmen were dispersed and a small detail of police left to prevent the work from being resumed.

After the Council proceedings rescinding the company's authority to build extensions had been signed by the Mayor, a letter was sent to the Detroit United Railway by the Commissioner of Public Works notifying the company that the permit issued last November to build double tracks, switches, etc., on Montclair, Schumacher, St. Jean, Warren Avenue East and Bewick has been canceled and any privileges granted thereby have been revoked. The Mayor expressed his willingness to go to the mat with the Detroit United Railway for a finish fight. He charged that the company started its men on the job on Harper Avenue without a permit on the very day he had named in requesting the company for a conference to determine what procedure was to be taken in regard to that extension. The Department of Public Works has been instructed to pave Harper Avenue and at the same time lay foundations for a street car line to be built by the city.

While the city was stopping work on the Harper line, another crew of track builders had begun work on the St. Jean extension. This work also was stopped by policemen after an experience somewhat similar to that in connection with the Harper line. Work there had also been started without the necessary permit from the Department of Public Works.

Paving Charges Withdrawn

The Janesville (Wis.) Traction Company has been relieved of the cost of street paving along its tracks. The ordinance as passed by the City Council on April 19 follows:

Sec. 1. In all cases where the streets of the city of Janesville upon which the tracks of the Janesville Traction Company are laid, or shall hereafter be laid, shall be paved or macadamized, the macadamizing, as the case may be, occasioned by the side tracks being laid in said street, such extra cost being measured by the difference between the cost per square yard of paving the roadbed of said company, and the cost per square yard of paving outside the roadbed; the term roadbed as herein used shall be understood to mean that portion of the street between the rails of said company and the short space outside the rails occupied by the ties. Said traction company, if dissatisfied with the bid for paving said roadbed, shall have the right to pave the same and collect of said city as compensation therefor a sum equal to the contract price per square yard of paving said street outside the roadbed; in case of such election by the traction company to pave its roadbed, the said company must perform said work in all respects according to the plans and specifications therefor, to the satisfaction of the Board of Public Works, and such work shall be commenced, prosecuted and completed in all respects as directed by the Board of Public Works, and within the time limit set by said board.

Sec. 2. The said Janesville Traction Company shall maintain and keep in repair its right-of-way in all streets, and shall repair any and all damage done to streets, or bridges of said city, or to the macadamizing or paving thereof, in the construction of its railway and the laying and repairing of its tracks, and shall replace any pavement taken up, destroyed or damaged, placing the same in as good condition as theretofore, and said Janesville Traction Company shall also protect and save and keep harmless the said City of Janesville from all claims for damages, costs and expenses arising from the negligent construction, negligent want of repair or operation of its said railway.

Sec. 3. If the said Janesville Traction Company shall fail or neglect to pay the extra cost of any such street improvement, or shall fail to restore any pavement displaced by it, or to keep the tracks, roadbed and right-of-way of said company in repair, as herein provided, or shall fail or neglect to level or remove the snow from its tracks, the Common Council shall have power to cause the same to be done and recover the costs therefor from said company.

Sec. 4. Any and all former ordinances, or parts thereof, so far as the same are inconsistent with this ordinance, are hereby repealed.

Sec. 5. This ordinance shall be published for three successive days following its passage, and shall be in force and take effect from and after its passage and publication.

Lima Talking Franchise

A controversy has arisen in Lima, Ohio, over the matter of a new franchise to the Ohio Electric Railway. Tentative drafts of a new grant were submitted some time ago by the city. These were revised and used as the basis of a proposal from the company. The ordinance proposition from the railway is based on the service-at-cost plan.

John E. Zimmerman, of Day & Zimmerman, operating managers for the Ohio Electric Railway in the interests of Drexel & Company, Philadelphia, Pa., has explained that the ordinance proposed by the company provides for the extension of the tracks in Lima to the Garford auto plant just as soon as viaducts can be built for the railway tracks. New cars for all city lines are specified, the type of rolling stock to be left to an agreement between the company and city officials. Power needs will be met temporarily by securing additional current from Toledo until such time as the Ohio Electric Railway can provide greater power facilities at its local plant.

The ordinance has been approved in joint session by company representatives and Councilmen. Opposed to the measure, however, is a citizens' committee. This committee desires its own franchise adopted and made mandatory on the part of the company. It is the contention of the citizens that improvements may be slow if the measure advanced by the company is adopted. To this objection it is explained that Drexel & Company, repre-

senting the holders of the bonds of the railway, are willing to advance funds to meet urgent needs in Lima, but that they could hardly be expected to go to any great expense unless assured that they would in the event of foreclosure be protected by an arrangement which would permit them to operate at a profit.

Sense of Perspective Preserved

The jitney has for some time been a problem at Asbury Park and Bradley Beach, N. J., where the Atlantic Coast Electric Railway operates. The unfairness of the competition is at last coming to be realized, however, as instanced in an editorial in the *Seacoast News* of Bradley Beach. This editorial is so apropos of the general condition which exists in communities where untrammeled jitney operation is permitted that the editorial is reprinted in part:

There is absolutely no return from the jitney owner, save possibly his automobile tax. Is it fair to encourage these men to ride before the trolley car and pick up its business when we are demanding all sorts of things from the trolley company? But we get the reply that the trolley service is poor. That may be so. There were times this winter when the steam service on the railroads was far from up to the schedule, and only a flying machine could make time. We are told that the equipment is poor. This may be. We do not question a 200 per cent rise in most commodities, but a 10 per cent rise in trolley fares is a crime to be seriously combated. Still these companies are paying the same ratio of increase for their necessities, including labor, that all other business is forced to pay. Is it reasonable to believe that under these circumstances the trolley company can provide the finest of rolling stock and the best of equipment? And yet with all these failings the trolley car is still more dependable than the lauded jitney bus. Because the trolley car is not on time and the jitney just happens along it is a great institution, but suppose we were waiting for a jitney bus and there was no trolley car to happen along? How long would it be before the jitney would be a confirmed nuisance? "Stand by the ship that carries you safely over," is a good maxim and one that should be seriously considered when we talk of discriminating in favor of the jitney bus. This institution is all right, but if posing as a common carrier it should come under the same laws as all common carriers and be subject to the same restrictions.

Trenton Suburban Strike Unsettled

There are still no signs of a settlement of the strike of the employees of the New Jersey & Pennsylvania Traction Company, Trenton, N. J., started three weeks ago. The company is operating few cars during the day and none after dark. Deputies armed with riot guns patrol the New Jersey divisions, while mounted police of the Pennsylvania State Constabulary guard the lines in that State. Farmers in Pennsylvania who patronize the company liberally by shipping milk and produce into Trenton also watch the Pennsylvania divisions.

Company officials, government mediators and employees have conferred, but no settlement could be reached. General Manager Thompson announced that all employees who failed to return to work after May 6 would lose their seniority in case they were reinstated by the company.

Kansas Court's First Railway Case

Assumed Jurisdiction Despite Railway's Plea That It Lacked Authority Under the Circumstances

An electric railway wage dispute has been decided by the new Court of Industrial Relations in Kansas. The order became effective May 1. The case was that of the local division of the Amalgamated Association against the Joplin & Pittsburgh Railway. In the opinion of the court a controversy existed between the employees and the company, and this controversy, if allowed to proceed, would endanger the continuity and efficiency of the service of the railway, would affect the transportation of the necessities of life, would produce industrial strife, disorder and waste, and would thereby endanger the public peace, threaten the public health and injuriously affect the general welfare of the public in the communities served by the railway. The court therefore assumed jurisdiction.

THE court finds that a fair and minimum wage to be paid to the complainants and others similarly situated by the railway is as follows:

Class of Service	Rate per hour Cents
Motormen and conductors:	
First three months	45
Next nine months	48
Next twelve months	51
After two years	55
Blacksmiths	55
Blacksmith helpers	45
Machinists	60
Machinist helpers	45
Carpenters—first class	55
Carpenters—second class	48
Painters	55
Painters' helpers	45
Pitmen	55
Pitmen helpers	45
Armature winders	60
Armature winder helpers	45
Car cleaners	45
Headlight, taillight and telephone men	$135 per month

The men contended that the wage paid by the railway was unfair, unreasonably low and not sufficient to provide reasonable living conditions for the employees and their families. The company contended that the court had no jurisdiction to hear and consider the complaint because the company was engaged in interstate commerce and that the company and its employees were subject to the transportation act as approved Feb. 28, 1920.

Court Has Jurisdiction

This contention was duly considered, but the court held that it had jurisdiction. Further time, however, was allowed to the company. In the second answer it reiterated its former stand and said that a wage contract, dated Aug. 1, 1914, and expiring Aug. 1, 1920, between the company and its employees was in existence and in full force and effect. The railway challenged the jurisdiction of the court to alter the terms of this contract. It alleged that for the court to do so would be in violation of the Constitution of the United States and also in violation of the Bill of Rights of the Constitution of the State of Kansas. It denied that any controversy had arisen which endangered or was likely to endanger the continuous operation of its electric railway.

On the other hand, the employees claimed the right to reopen the case before the Court of Industrial Relations on the ground that the War Labor Board had ceased to function and that the Industrial Relations Court, having been created since the War Labor Board went out of existence, was the proper body before which the matter should be heard. As stated before, the railway claimed that the contract of Aug. 1, 1914, precluded any such submission to the court. In this controversy the court held with the complainant.

Wages Before Dividends

The court said that the most serious difficulty which confronted it was the determination of the ability of the industry to pay the increased wage. Wages of labor should, however, be considered before dividends to the investor and a business which was unable to pay a fair rate of wage to its employees would eventually have to liquidate. The Kansas law imposed upon the court the obligation, so far as it has the power to do so, to assure to labor a fair wage and to capital a fair return.

There are also before the new court other cases involving electric railways, notably those affecting linemen and other employees of the Joplin & Pittsburgh Railway and one involving trainmen of the Topeka Railway.

Short Strike in London, Ont.

The Ontario Railway & Municipal Board, summoned by the City Council of London, Ont., restored service on the railway system of that city on May 5, thus ending a strike begun on May 1. The men had asked for 65 cents an hour. They agreed with the railway board to return for a test of the company's earnings, and to accept in wages a distribution of whatever revenue remained after paying other operating costs and bond interest, but with no allowance made for dividends to shareholders. This arrangement is to continue for a period of three days to two weeks, as required by the Railway Board, as a basis for a report on the necessity or otherwise of fare increases.

An increase in existing rates of seven and nine tickets for 25 cents, with free transfers, was refused by vote of the people on Jan. 1, when the company was prepared to accept six and eight tickets for 25 cents. Now the company has informally indicated that nothing less than 5 cents straight or six tickets for 25 cents can suffice, because of increased operating costs. Before the strike the men were offered a renewal of the existing wage agreement providing a maximum wage of 44 cents an hour.

An Unprecedented Appeal

Boston's Chief Executive Thinks Trainmen Well Paid with a Wage Advance of 150 Per Cent in Ten Years

An unprecedented appeal was made by Mayor Peters on May 4 to the Boston Elevated Railway to refuse the demands of its trainmen for increased wages. The Mayor defended his position on the ground that arbitration boards and certain groups of employees have in the past been prone to lose sight of the general public's welfare in industrial disputes affecting public utilities. He submitted figures to show that the trainmen are now on a wage basis somewhat similar to the Boston policemen and firemen, although the police and fire departments "demand a higher average of competency than is required of motormen and conductors." The protest was addressed to H. Ware Barnum, general counsel of the company.

THE Mayor's letter reviewing the situation as he saw it follows substantially in full:

Since the time that the daily papers carried the announcement of the demands of the motormen and conductors, I have been considering the propriety of writing to the elevated in order to lay before the trustees certain facts which should be considered by any board which might be appointed to pass upon the demands of the employees. The facts that I have in mind have not, I fear, been given proper consideration in the past, and if they are not considered at this time, a grave injustice will again be done the citizens of Boston as a whole.

Public Interest Predominant

I believe it may be safely said that the public interest is predominant in industrial disputes, especially in the case of public utilities, and it is my duty as Mayor to defend the public interest. This observation is more readily applicable to the case at hand for any deficit in the operation of the elevated must be met by the cities and towns which it serves. The demands of the carmen cannot therefore be considered as an isolated unit; they must rather be treated as only a part of a question in its relation to the whole. Increases in compensation to motormen and conductors in the elevated system at the present time will certainly react most unfavorably, not only on the industrial situation in Boston, but on the citizens as a unit.

I wish it distinctly understood that I am in no way attempting to abrogate the right of the workingman to better his condition when such an endeavor on his part may achieve success without injustice being done to other workingmen. In short, the recognition of a right cannot and must not mean the failure to recognize other equally important rights. Therefore, as the chief executive of the city, I feel it my duty, as well as my responsibility, to impress upon the arbitration board the fact that the interest of the public at large is paramount, and if this interest is served, that of the carmen cannot suffer. I write this letter only after the most deliberate consideration, for I appreciate that my action is not only unusual, but almost without precedent, and for that reason I have made absolutely certain of my ground before proceeding.

Comparison with Policemen

In the case of thousands of city employees, it would be very difficult to compare their duties and terms of employment with those of the carmen of the elevated. On the other hand, there are certain groups of city employees whose compensation and conditions of public employment are such that the comparison with the work and compensation of the carmen would be justified. I have in mind four groups: policemen, firemen, mechanics and laborers.

Both in the police and fire departments, privates are on the same salary basis. They enter the service at $1,400 a year and progress $100 a year for four years until they reach the maximum of $1,800. The motormen and conductors, on the other hand, need work only one year before the maximum is reached. Therefore, on a daily wage basis we find the salary schedule over a period of four years, as follows:

	Police and Firemen.	Motormen and Conductors.
First year	$3.83	$4-$4.40
Second year	4.11	4.80
Third year	4.38	4.80
Fourth year	4.66	4.80
Fifth year and after	4.93	4.80

The police receive one day off in eight and they receive no overtime. Firemen receive one day off in three, and it should be remembered that practically all of the two days they are on duty must be spent at the station house. Both receive two weeks' vacation without loss of pay.

I believe, and I think it is generally admitted, that the firemen and police are receiving a fair compensation for the work performed. I have no hesitation in stating most emphatically that I believe it is the opinion of the majority of our citizens, and I believe this opinion is sound, that the duties and the responsibilities of the firemen and police are greater than those of the motormen and conductors, and without any reflection on the elevated's carmen, I think it may fairly be admitted that the police and fire departments demand a higher average of competency than is required of the motormen and conductors.

The conclusion is obvious: The firemen and police are receiving a fair compensation for the work performed; their responsibilities are greater than those of the conductors and motormen, the police and fire departments requiring a higher average of competency; therefore any increase in the salary of carmen which would automatically yield them a higher salary than the police and firemen is not only unwarranted, but it would work an injustice to certain municipal employees.

150 Per Cent Increase for Trainmen

The only other two classes in the city employees which are susceptible to comparison are the mechanics and laborers. In the new budget mechanics are receiving $4.50 and $5 a day, the greater portion receiving $4.50. The laborers are now receiving $4 a day. The terms of their employment give them two weeks vacation without loss of pay. No overtime is paid, time off being given to offset overtime.

It would be very difficult to attempt to compare the salaries of teachers with those of motormen and conductors, for there are far too many groups.

I have before me a statement showing the rates of wages for motormen and conductors during the past thirty-two years. In January, 1910, the hourly rate was fixed at 23 cents. This has gradually risen, until in July of last year the hourly rate, after one year of service, was fixed at 60 cents—an increase in ten years of more than 150 per cent. Certainly no corresponding increase has been granted to other public employees.

The Boston Elevated is not in what could be termed a prosperous condition. I believe I voice the sentiments of a great majority of our citizens when I say that it would be most unmoral to grant any increase to the employees of the elevated were such an increase by any possibility to cause a deficit in the elevated's finances. Under such conditions the primary consideration is the great public.

The elevated carmen are at the present time receiving a good wage, and, I say this only after the most mature deliberation, they should not receive any additional compensation until they have shown themselves worth more by causing the elevated to show increased earning capacity. They must not forget that they are part and parcel of the elevated system. They have it in their power to increase or decrease the earning capacity of the company through an improved service to the public. Until they give the public a service which enables the elevated to show a greater earning power, they are not entitled to a higher wage, and not until that time should they be given increased compensation.

This is a doctrine which I believe has been too much disregarded in the past, and it cannot be overestimated at the present time.

I feel so strongly on one point that I hope you will pardon my apparent reiteration. I am convinced that the time has passed when industrial disputes, particularly those affecting public utilities, can be settled without reference to the effect that such settlements may have on the public as a whole. Arbitration boards in the past have been prone to lose sight of the large questions of public policy which may be involved, and certain groups of employees have been inclined to take this same attitude in pressing their demands.

The time has come when we can no longer shut our eyes to the fact that employees of public service corporations should enforce their rights only as far as they do not conflict with or encroach upon the greater rights of the public.

I hope that the arbitration board will have this fact in mind at all times, and will not lose sight of the fact that the motormen and conductors received an exceedingly liberal increase last summer. The members of the arbitration board are invested with a public trust, and I feel certain that no personal prejudice will prevail in their decision, and that they will make their decision purely in the interest of the public, for after all, the best interest of the public as a whole is the only insurance of the welfare of individual groups of employees.

"No Accident Week" June 6-12

A committee has been organized among the safety and employment managers of public utility properties in the States of New York and Pennsylvania to encourage interest and conduct a "No Accident Week" on the days from June 6 to 12. The plan has the backing of a number of prominent public utility interests in the States mentioned and G. R. Rinke, secretary Utilities Mutual Insurance Company, 5 Nassau Street, New York, has been appointed secretary. Success is expected because of a previous safety effort made by a number of public utilities during the week of Nov. 16-22. The influence of this week was found to continue in more marked attention to safety.

The organization in charge has prepared a poster in colors to be issued about a week ahead of the "No Accident Week," and during the week there will be about six bulletins for daily changes. There will also be an attractive button. Among the railway companies which have agreed to carry out the program are the Albany Southern Railroad, Buffalo & Lake Erie Traction Company, New York, Westchester & Boston Railway, Northwestern Pennsylvania Railway and the Buffalo, Lockport & Rochester Railway.

Wages in St. Louis Will Be Arbitrated

The motormen and conductors of the United Railways, St. Louis, Mo., have decided to submit their request for higher pay to arbitration. The proposal is that the men select an arbitrator, the company another and that these two agree upon a third, who will make up the board of three, to whom the whole matter will be submitted. Such a proposal necessarily includes an obligation to abide by the decision of the arbitrators. No provision is made in the arrangement for representation of the interests of the public, which, however, are protected in theory by the State Public Service Commission.

The demands of the men are for 75 cents an hour for the first six months

of employment, 80 cents the second six months, and 85 cents thereafter, together with an actual eight-hour working day. They were rejected by Receiver Rolla Wells. The men now receive 50 cents an hour for the first year, 55 cents the second year and 60 cents thereafter.

Labor for Higher Fares

Wilmington Union Tells Central Labor Body Increases Are Necessary—Unfair Bus Competition Protested

The Wilmington Division of the Amalgamated Association, which is associated with the Wilmington & Philadelphia Traction Company, has addressed a long letter to the Central Labor Union of Wilmington protesting against unfair bus competition and upholding the right of the company to charge higher fares. The letter was in reply to one sent to the local union by the Central union.

In referring to bus competition the railway employees make it plain that they believe the buses should be regulated on the same basis as the electric railways. They say:

> As a labor organization interested in the health and safety of the people of the community, the trolleymen's union is working for fair standards of regulation and safety, which, as the one organization intensely interested in a square deal for its members and the public, feels it is in the right in expressing its views in an open and above-board manner.

On the question of higher fares the letter calls attention to the lower purchasing power of the nickel and the large number of cities in which fares have been increased, in some cases as much as 10 cents. Considerable space is also given to a comparison of the fare and operating conditions in Wilmington and in the neighboring city of Philadelphia to prove that there is nothing in the practice in the latter city to show that a higher fare in Wilmington is not necessary. The local union concludes its letter by saying that in its preparation the union has not consulted the officials of the company, but "the cost of living has affected street railway companies just as much as it has affected workmen."

National Legislation for Utility Disputes

The Royal Commission on the unification of labor laws in the Dominion of Canada has brought in a recommendation that all disputes in public utilities should be dealt with exclusively by federal legislation. This includes public utilities under control of the provinces. If the suggestion should be enacted into law, it would mean that the Hydro-Electric Power Commission and the Hydro-Electric Radial system would come under the federal act in regard to wage disputes, etc., despite the fact that these enterprises are owned and controlled by the municipalities, but with provincial backing for their bonds.

Valuation a Stumbling Block

Toledo Commissions Holding Back Their Reports—City Provides Legal Fund

Emergency legislation was passed by the City Council of Toledo, Ohio, at its meeting on the night of May 10, appropriating a fund of $20,000 as a war budget to meet Henry L. Doherty and the Toledo Railways & Light Company in a legal battle in federal court. The railway interests called the fight when they asked for 10-cent fares with 2-cent transfer charge, with the added purpose of establishing a valuation, settling the fairness of charges for power and determining the status of the whole street railway question. The city has made no reply to the brief filed by the company, but since the Council has authorized the expenditure of $20,000 for expert legal and technical advice it is thought the city will attempt to bring on the case as soon as possible.

IN the meantime the two commissions which have been working for several months framing cost-of-service and municipal ownership ordinances have been putting the final touches on their work. It is expected they will submit the ordinances to Council in time for the meeting on May 17. Many of the Councilmen believe that the federal court case in which the valuation is fixed will have to be completed first before the propositions can be consistently submitted to the people. At the present time the city is insisting on a valuation of $7,110,000. Henry L. Doherty says his property is worth $15,000,000.

Mr. Doherty has won practically all of his contentions in the final sessions of the commission at which time his objections to the original draft of the ordinance have been considered. He has been in conference with the commission recently on the proposed plan for gradual ownership of the lines by the city. The commissioners and Mr. Doherty agreed recently on the main features of a plan by which the city would gain an equity in the property through the retirement of bonds with the proceeds of the sinking funds provided by the ordinance. However, the final question will involve the matter of valuation. There is such a divergency on this point that it is doubtful whether any agreement can be reached without the court action.

One Commission Waits for Other

The municipal ownership division has been prepared to report for some time, but has been awaiting the completion of the cost-of-service report. This commission has also had the valuation for a stumbling block. The members have surveyed many of the lines in the city with a view to rerouting and have also looked over lines in New York and Detroit in quest of the latest plan for public ownership.

When the issue will reach the voters is problematical. Most of the Councilmen are in favor of hasty submission in an effort to remove the railway question from the possibility of another ouster action when snow flies. Many yet feel that the city's final club is to oust. This was evident in the debate over the $20,000 fund for the legal battle.

If the measures are submitted to the Council on May 17 it is certain that the Council will recommend an election immediately. This will bring the vote one month later or perhaps late in June. There is a possibility that neither measure will be adopted. In that event, the matter will then be thrown into the hands of the court.

Case May Be Called in Fall

The federal court calendar is in such shape at the present time that Judge Killits declares it may be early fall before a hearing on the recent petition of the railway may be heard. However, the judge may be able to advance the hearing if it is shown that the valuation must be determined to enable a final settlement this summer.

The judge set a time limit for filing petitions for higher fare or other relief depending upon an investigation into railway issues, of which neither the company nor city took advantage.

In the argument for the passage of the $20,000 fund for legal assistance in the coming federal court fight Mayor Schreiber, Law Director Martin, and some of the Councilmen openly declared they believed there was strong possibility of neither settlement being accepted by the voters. In such a case they said it would pay the city to fight the company's valuation in court so that lower fares might follow if the property were operated on the cost-plus basis by the court.

The company has asked a "10 and 2" rate of fare to supplant its present rate of "7 and 2." It wants 8 per cent return on its investment with allowance for amortization. The company asserts that the present return is less than 3 per cent.

It also recites ordinances which give it a right to the streets without franchise and declares that the Miller public abandonment law does not apply to railway property in cities and if it does apply is unconstitutional.

Socialist for Immediate Action

Three Socialist members of the Council opposed the expenditure of any money to fight the railway in court. One of the radicals came out for immediate enforcement of the ouster ordinance in answer to the company's request to the court for 10-cent fares.

The city's valuation commission was hired with money advanced by the railway. Now the city finds it necessary to provide a large fund to bring these experts back as witnesses in the court hearings which will be held on the matter of valuation.

Sentiment Against Increase

All Pittsburgh Opposed to Wage Advance if Fares Must Be Raised Correspondingly

Trainmen of the Pittsburgh (Pa.) Railways cannot possibly be granted anything like a substantial increase in wages unless the company raises the fare to four checks for 35 cents. This, at least, is said to be the firm opinion of Receivers C. A. Fagan, S. L. Tone and W. D. George. While none of the receivers would affirm this, they would not deny that they will take this stand at future conferences between Mayor E. V. Babcock, the City Council and representatives of the trainmen.

Receivers Fagan, Tone and George are strongly opposed to increasing the fare. They hold that increases in fare are invariably followed by disastrous decreases in riders. The net financial result does not justify the action. Their opinion is that their contention on this point is given verisimilitude by the opinions of some of America's foremost traction experts.

It is a fact that the receivers, if forced to grant the trainmen one-half of their demanded 75 per cent wage increase, must abandon their program for rehabilitating the company's properties. They must forego the contemplated purchase of many double-truck cars and extensive city street improvements, as well as track repairs which have been declared essential for more than a year. The trainmen are demanding a maximum wage of 91 cents an hour and material improvements in working conditions.

Mayor Babcock seems to be handling the situation all himself. He is summoning conferences almost daily between representatives of the trainmen, City Council and others, but the receivers have not been invited to participate in these meetings since April 27. It is understood that Mr. Babcock intends to invite the receivers in either late this week or early next week.

On May 10 the Mayor called a meeting of the City Council and representatives of the trainmen. At this meeting talk turned to the possibility of selling three checks for a quarter or four for 35 cents. The Mayor was represented as being opposed to any increase in fare, while the City Council is reported to be divided on the matter. The city officials had before them a special financial report furnished by Receivers Fagan, Tone and George.

It is understood that the Mayor will have some suggestion to make to the receivers when they are called into the conference.

When the proposition of selling three tickets for a quarter was broached at the Mayor's conference it was "pointed out" that this would mean an increased revenue of some $2,080,000 to the car company, "enough to allow of a wage raise of 12 cents an hour to each conductor and motorman." This, it was said, is on the assumption that travel does not fall off in volume. The annual traffic is now 250,000,000 passengers, it was explained, thus making each 1 cent of fare yield $2,500,000 to the company.

To raise the employees' wages 1 cent an hour, it was estimated, would require $167,000.

In the meantime civic organizations all over the Pittsburgh district are holding meetings and passing resolutions opposing an increase in wages for the trainmen, provided a wage raise is accompanied by an advance in fare rates.

Cleveland Wage Plan Accepted

The second vote of the platform men of the Cleveland (Ohio) Railway on the wage proposition made by President J. J. Stanley stood 2,008 for to 238 against. The balloting took place on May 7, after the local officials and Vice-President Fitzgerald of the Amalgamated Association had advised the men of the arrangements made for the submission of the schedules to a special committee of the City Council for readjustment. The first vote, taken several days before, resulted in the defeat of the proposition by 1,806 to 401.

The union thus withdraws its demand for time and one-half above eight hours a day, while the company drops its contention for the open shop and employment of women as conductors. The increase in wages amounts to 15 per cent and the minimum day is raised from five hours to six hours. The new rates will be 70 cents for the first three months of service, 73 cents for the next nine months and 75 cents thereafter.

Hearings on changes in the schedules to improve running conditions must be begun before the special committee by May 20, but no time has been set for a decision. Union officials have expressed the hope that the committee will hurry matters through as soon as possible.

On the evening of May 10 the Council enacted an ordinance making the rate of fare 5 cents, with a 1-cent charge for transfers. The old rate was six tickets for a quarter, with a transfer charge of 1 cent. It is thought that this rate will cover the increase granted the men, but it will depend to some extent upon the changes which the committee makes in the schedules.

Municipal Ownership Vote June 21

Municipal ownership of the Duluth (Minn.) Street Railway will be submitted to the people at the special city election to be held on June 21, at which time the 6-cent fare referendum ordinance will also be voted on, the City Council has decided. Municipal ownership of the railway was voted down a year ago, but upon the suggestion of the Federated Trades Assembly the Council has passed an ordinance which, upon approval at the special election, will permit the city authorities to issue $3,500,000 in bonds to be used for the purchase or condemnation of the lines of the Duluth Street Railway.

News Notes

Wage Increase Refused.—President Rankin Johnson of the Trenton & Mercer County Traction Corporation, Trenton, N. J., has refused to grant any increase in pay to the employees.

Five-Cent Wage Increase. — The Monongahela Valley Traction Company, Parkersburg, W. Va., has increased the wages of its platform men 5 cents an hour, beginning May 1. Other employees received proportionate increases.

Campaign for Saving Started.—A considerable part of the issue of *Here We Are* for May 1 is devoted to an explanation of the building and loan plan for its employees being advocated by the Georgia Railway & Power Company, Atlanta, Ga.

Valuation Before Mechanical Engineers.—Valuation topics will occupy a leading place at the spring meeting of the American Society of Mechanical Engineers to be held in St. Louis, May 24 to 27. Other matters to be discussed are power and combustion and the new elevator code.

Seventy Cents in Des Moines.—The arbitration of wages for employees of the Des Moines (Ia.) City Railway last week resulted in an award of 70 cents an hour. As the road is in the hands of a receiver, the award must be approved by the federal judge before it can become effective.

Trainmen Don Overalls.—The employees of the Monongahela Valley Traction Company, Fairmont, W. Va., have voted unanimously to form an "overall" club and to discontinue the use of uniforms such as have been worn by the trainmen. There are 125 trainmen employed by the company.

Interurban Raises Wages.—The Androscoggin Electric Company, Lewiston, Me., has posted notice of a voluntary increase in wages of its employees. Under the new scale Portland-Lewiston interurban trainmen's wages range from 53 to 55 cents an hour, a flat increase of 10 cents.

Sixty-Cent Scale Suggested.—The International Railway, Buffalo, N. Y., has submitted to the Amalgamated proposed adjustments and procedure which it is understood are to be presented by that association to the employees for consideration. The wage maximum is raised from 48 cents to 60 cents.

Board to Decide Ottawa Demands.—The employees of the Ottawa (Ont.) Street Railway having failed to reach an agreement with the company in regard to a demand for increased wages and better working conditions have decided to apply to the Department of Labor for the appointment of a board of conciliation.

New York May Take Bridge Line.—By a vote of forty-nine to fifteen the Board of Aldermen of New York has passed an ordinance which authorizes the city to take over the electric railway running over the Williamsburg Bridge which has been operated by a private company on a temporary franchise which expires May 31.

Another Carhouse Robbed.—About 1:30 a.m. on April 12 four men, masked and armed, entered the carhouse of the Pan Handle Traction Company, north of Follansbee, W. Va., tied the foreman and his two assistants, blew open the safe containing the company's receipts for the day, took everything valuable in sight and escaped in an automobile.

Portland Wages Being Arbitrated.—The matter of the settlement of the wage demands of the trainmen of the Cumberland County Power & Light Company, Portland, Me., is before a board of arbitration, consisting of G. L. Brooks, representing the men; F. H. Perkins, representing the company, and A. H. Hall as umpire chosen by Mr. Brooks and Mr. Perkins.

Increase in Pay on Lake Shore.—Conductors and motormen on the Lake Shore Electric Railway, Cleveland, Ohio, and Lorain Street Railway have received a 10 per cent increase in wages. The new wage scale is 54 cents an hour for new men, 56 cents an hour for two-year men, 58 cents for third-year men and 60 cents an hour for men serving their fourth year or more.

Interurban Strike Averted. — A threatened strike on the Niagara, St. Catharines & Toronto Railway was averted a few hours before the time set for the walkout on May 1. Four employees who had been dismissed will be reinstated. An agreement has been entered into between the company and its men to settle other grievances by means of a local board of conciliation at St. Catharines.

Council Fixes Railway Pay.—The railway committee of the City Council of Guelph, Ont., has recommended to the Council that the city shall pay its employees on the railway as follows: Carhouse men, 45 cents an hour; foremen, 47½ cents; conductors and motormen, first year, 41 cents; second year, 43 cents, and third year, 45 cents an hour. The maximum for platform men is now 41 cents.

Conciliation at Winnipeg. — Two boards of conciliation have been appointed by the Minister of Labor at Ottawa to settle disputes between the Winnipeg (Man.) Electric Railway and its railway and gashouse employees. The company is to be represented on both boards by W. J. Christie, Winnipeg, and the men by R. S. Ward, also of Winnipeg. The chairman has still to be selected.

Wages and Fares Coupled in Sarnia.—The employees of the Sarnia (Ont.) Street Railway have made a demand on the company for a 35 per cent increase in wages. The company claims it cannot meet the demand unless the present fare of 6 cents is increased to 7 cents. A strike is threatened. The matter is now up to the City Council, which has it in its power to allow the company the increase asked.

Permanent Traffic Body Proposed for London.—The advisory committee on London traffic, appointed by the Ministry of Transport, issued its report on March 25. It recommends the setting up of a permanent statutory body to be called the London Traffic Authority consisting of three members appointed by the Government and paid salaries. The authority is to deal with all questions relating to traffic in the metropolis.

City Ownership Agitated.—The City Council of Chatham, Ont., has presented a resolution to the Ontario Hydro Radial Commission asking the commission to investigate the feasibility of acquiring and extending the Chatham, Wallaceburg & Lake Erie Railway from Wallaceburg to Chatham. Investigation of the proposed electrification of the Pere Marquette Railway between Chatham and Sarnia is also asked.

Canadian Road Offered to City.—The Sudbury-Copper Cliff Suburban Electric Railway has made a formal offer to sell its radial system to the town of Sudbury, Ont., for $222,921. This amount is stated to represent $208,680, the actual cost of the system and its equipment, plus $14,251, representing three years' dividend on preferred stock. The company will accept ten, fifteen and twenty-year municipal debentures in payment.

Wage Question to Arbitration.—On April 29 the platform men of the Northern Ohio Traction & Light Company voted to submit the wage dispute between them and the company to arbitration. The same action had been taken in Canton and by the interurban men. A threatened strike was thus averted. Terms of the present contract provided for arbitration in case of a disagreement on wages and conditions. The company has chosen one man and the employees will select another. If these two fail to agree upon a third the selection will be made by Governor Cox.

Suburban Men Get Increase.—The trainmen of the Syracuse & Suburban Railway, Syracuse, N. Y., have been granted a wage increase of 33⅓ per cent. There are no franchise limitations for this company in Syracuse, Manlius or Fayetteville, through which the line operates, and a boost in the fare is not only possible but probable. The residents of the villages have shown no opposition to such a contingency. C. Loomis Allen, general manager, the Corporation Counsel of Syracuse and the Presidents of the villages through which the suburban cars operate took the matter informally before the Public Service Commission to show the need of increased revenue.

Programs of Meetings

Iowa Electric Railway Association

The program of the sixteenth annual convention of the Iowa Electric Railway Association to be held at the Fontenelle Hotel, Omaha, Neb., May 20 and 21, has been announced as follows:

The Thursday morning session, May 20, will be devoted to the address of President F. J. Hanlon, Mason City, Iowa, and to the reports of the secretary and various committees, including that of the Iowa Committee on Public Utility Information, by H. E. Weeks, Davenport, Iowa. The Thursday afternoon session will be devoted to a discussion of "Street Railway Legislation" and "Service-at-Cost Franchises." Several delegates have been listed on the program to present prepared discussions on each of these subjects.

At the Friday morning session the subjects of "Safety Cars" and "Labor Conditions and Agreements" will be similarly discussed. This discussion will be followed by the final reports of committtees and election of officers. Immediately following adjournment the delegates will proceed to Lake Manawa for luncheon and the afternoon, as the guests of R. A. Leussler, general manager of the Omaha & Council Bluffs Street Railway.

Pennsylvania Street Railway Association

The Pennsylvania Street Railway Association will meet at the Penn-Harris Hotel, Harrisburg, Pa., on May 27 and 28. The session on the morning of May 27, starting at 11 o'clock, will be devoted to the address of President Gordon Campbell, the reports of committees, the report of the secretary and treasurer and the appointment of the nominating committees. In the afternoon these papers will be presented:

"Hazards in the Electric Railway Field," by Edward C. Spring, Lehigh Valley Transit Company.

"Mutual Safeguards," by Miss Laura M. Roadifer, Philadelphia Rapid Transit Company.

"Public Policy Talk," by J. G. Gredler, Harrisburg Railways.

There will also be a discussion on the value of uniform system of making reports to the different departments of the commonwealth, under the direction of Carl N. Martin of the Trenton, Bristol & Philadelphia Street Railway.

On the morning of May 28 the following papers will be presented:

"Modern Methods of Prolonging Track Life," by E. A. Hoffman, Wilkes-Barre Railways.

"Reasonable Rate of Return on Investment," by C. L. S. Tingley, Altoona & Logan Valley Electric Railway.

"The Library as a Business Asset," by H. B. Megargee, American Railways.

"Pulverized Fuel for Peak Load Service at Railway Power Houses," by O. M. Rau, Philadelphia Rapid Transit Company.

Financial and Corporate

Reorganization Planned

Details Arranged for Successor to Jackson Light & Traction Company, to Be Sold Under Foreclosure

About 14 miles of electric railway, the electric light plant and the gas works, also certain parcels of real estate belonging to the Jackson Light & Traction Company, Jackson, Miss., will be sold under foreclosure at Jackson on May 26, as a result of proceedings instituted by the Chicago Trust Company, trustee, representing the holders of first mortgage bonds, due April 1, 1922, interest and sinking fund payments on which are in default.

Review of Bondholders' Plan

A bondholders' protective committee, of which William T. Bacon is chairman, has drawn up a plan for the reorganization of the company. This plan provides that a new corporation, to be known as the Jackson Public Service Company, shall acquire the new franchise and all the assets of the Jackson Light & Traction Company and issue immediately $1,055,000 of first mortgage sinking fund gold bonds, of which $930,000 are to be delivered, bond for bond, to the holders of certificates of deposit for the Jackson Light & Traction Company first mortgage 5 per cent bonds.

It is explained that under the Mississippi statutes priority over the old Jackson Light & Traction Company bonds was urged by general creditors whose claims amounted to more than $100,000. It was thought that this claim could be defeated, but in order to avoid possible litigation an agreement with the general creditors was reached whereby they are to accept bonds of the new issue and dismiss their claim to priority. Accordingly $125,000 of bonds of the new issue are to be certified at once, out of which the satisfaction of all general creditors and of all the expenses of attorneys, engineers and members of the protective committee are to be accomplished. This will make the total amount of bonds which are to be issued $1,055,000.

Fifteen-Year Bonds Proposed

The new bonds are to be dated Oct. 1, 1919, and are to mature Oct. 1, 1934. They are to bear interest at 5 per cent to April 1, 1922, the maturity date of the Jackson Light & Traction Company bonds, and 6 per cent thereafter until maturity. They will be protected by a contract with the American Public Utilities Company, under which the latter guarantees the priority of the new issue over all liabilities incurred by the new company. The interest which was due and unpaid on April 1 and Oct. 1, 1919, on the old issue of bonds is to be paid by scrip maturing in four annual installments on Jan. 1, 1921, to Jan. 1, 1924, inclusive.

The properties are now being operated under increased rates and have been showing sufficient earnings to protect the bondholders under the plan of reorganization which has just been outlined. A municipal election was held in Jackson on Jan. 17, 1920, at which a new twenty-five-year franchise was voted for the operation of the properties. The sale of the properties in bankruptcy was effected last year.

City Not Keen About Taking Road

The New York & North Shore Traction Company, operating from Flushing to the city line at Little Neck, Long Island, and into Nassau County, shut down recently on account of inability to obtain coal at reasonable prices. The cause for the shut-down has been investigated by the Public Service Commission for the First District. At the hearing at which the investigation was made George A. Stanley, president of the company, stated that so far as he personally was concerned he favored an agreement whic' would permit the road to be leased to the city and be operated by the latter for a period of several years, until business conditions have resumed a normal character.

The representative of the city of New York who was present at the hearing, however, stated that the city would not be bound by any such proposal. President Stanley stated that as soon as the company could get coal operation would be resumed, but pointed out that the operation of the road during 1919 had cost the stockholders and bondholders some $50,000 more than had been received for fares and that the stockholders and bondholders had recently been subjected to an assessment of $17,000 in addition to assure the continued operation of the road.

Long Island Trolleys Lose

Five Feeders of Long Island Railroad Fail to Meet Combined Costs of Operation

The thirty-seventh annual report of the Long Island Railroad, which covers operations for the year ended Dec. 31, 1918, gives information concerning the operation of the several electric lines owned and operated by that company. The accompanying table shows that for the year the trolley operations were conducted at a loss of nearly $10,000. Only two of the lines proved self-supporting. They were the Ocean Electric Railway and the Nassau County Railway. They earned 40.5 and 3.92 per cent respectively on their outstanding capital stock.

Year Ended Dec. 31, 1918	Ocean Electric Railway	Huntington Railroad	Northport Traction	Nassau County Railway	Glen Cove Railroad	Total
Operating revenues	$156,929	$41,850	$10,425	$14,949	$24,882	$249,035
Operating expenses, taxes and uncollected railway revenue	101,204	61,863	12,041	12,994	24,015	212,117
Operating income	$55,725	*$20,012	*$1,617	$1,955	$867	$36,918
Non-operating income	303	212	213	212	212	1,152
Gross income	$56,028	*$19,800	*$1,404	$2,167	$1,079	$38,070
Deductions from gross income	41,879	3,044	837	793	1,237	47,790
Net income	$14,149	*$22,844	*$2,241	$1,374	*$158	*$9,720
Dividends	None	None	None	None	None	None
Balance to profit and loss	$14,149	*$22,844	*$2,241	$1,374	*$158	*$9,720
Outstanding capital stock	35,000	30,000	45,000	35,000	10,000	155,000
Outstanding bonds	20,000	26,000	None	None	None	46,000
Miles of single track	15.59	19.97	2.74	1.60	3.50	43.40

* Deficit.

Valuation Bill Passed Over Veto

The so-called Allen bill providing for the valuation of the property of the Public Service Railway of New Jersey has been passed over the veto of Governor Edwards. The Governor considered the measure too indefinite. He regarded it as an invitation to litigation. Under the new law the Governor was designated as a member of the valuation commission. He has now announced that he will not serve on the commission. It is his opinion that even if he were disposed to serve he could not do so because the State Constitution prohibits him from accepting any other office while serving as Governor.

State Treasurer William T. Read and State Comptroller Newton A. K. Bugbee will be in control of the valuation. An appropriation of $100,000 becomes available at once to proceed with the work. Mr. Bugbee is reported to have said that his personal view on the subject was that the State House Commission should retain the services of an expert firm of engineers of unquestioned standing to make the appraisal of the physical property of the electric railway corporations. It was his view, however, that the commission should exercise supervision in the fixing of valuations, and that these should not be based upon either present values or the values obtaining nine or ten years ago. He believed that valuation should fall somewhere between these figures, and that the commission should adopt the proper rule.

Baltimore Is Optimistic

Seven-Cent Fare, Recently Established, Should Benefit Public and Restore Confidence of Investors

There is a strong optimistic tone in the annual report of the United Railways & Electric Company, Baltimore, Md., recently issued for the year ended Dec. 31, 1919, notwithstanding a decrease of 26 per cent in net income and failure to meet all dividends during the year.

During the year there were two fare changes. On Oct. 1, 1918, the unit rate of fare was increased from 5 cents to 6 cents. This rate prevailed until Oct. 1, 1919, when the unit cash fare was again changed to 7 cents cash or 6.5 cents by tickets. The large reduction in fare gained by the use of tickets caused approximately 90 per cent of the passengers to use the 6.5 cent ticket rate, so that in effect the average rate paid was only slightly more than 6.5 cents. These fares produced a gain in railway operating revenue of 24 per cent.

On Jan. 1, 1920, a straight 7-cent fare was made effective due to the fact that the 6.5 cent fare failed to produce sufficient revenue and allow the company the surplus recommended by the Maryland Commissioners in their prior decision due to the 33.6 per cent increase in operating expenses. The company hopes, however, that with the 7-cent fare in effect it will be able to get its roadbed and equipment in good operating condition, establish credit for new cars and capital expenditures and meet every reasonable demand for adequate service.

Already thirty-three safety and 100 center-entrance trailer cars have been ordered. They are expected to produce material economies in both platform labor and power consumption as well as wear and tear on the track and special work. Sixty double-truck cars designed for train service were also purchased through agreement with a United States governmental agency.

Considerable work was done also during 1919 in rebuilding and improving the rolling stock then in service. New motors of modern design were installed under 110 cars. Power saving recorders and new type thermostats were also installed in all cars for the purpose of reducing the consumption of power. The work of vestibuling the open-end cars was continued, with the result that at the end of the year a total of 370 cars had been completely vestibuled. At the company's shops twenty-seven single-truck cars were remodeled for use as trailers. Nine cars were likewise remodeled to adapt them to the one-man plan of operation.

The accompanying table shows the financial status as compared with the previous year, together with the percentage change in each case.

INCOME STATEMENT—UNITED RAILWAYS & ELECTRIC COMPANY OF BALTIMORE

Year Ended Dec. 31	1919	1918	Percentage change +Inc. — Dec.
Revenue from transportation	$14,711,455	$11,672,229	+26.04
Revenue from other railway operations	82,779	257,473	—67.85
Total railway operating revenue	$14,794,234	$11,929,701	+24.01
Railway operating expenses:			
Way and structures maintenance	$915,289	$551,755	+65.89
Equipment — maintenance	919,863	716,237	+28.43
Power maintenance	64,080	32,887	+94.85
Depreciation	739,712	596,485	+24.01
Power service	1,027,846	1,040,158	— 1.18
Conducting transportation	4,898,515	3,518,311	+39.23
Traffic	5,262	16,561	—68.23
General and miscellaneous	1,361,383	963,913	+41.24
Total railway operating expenses	$9,931,950	$7,436,307	+33.60
Net operating revenue	$4,862,284	$4,493,394	+ 8.20
Taxes assignable to railway operation	1,409,262	1,160,452	+21.40
Operating income	$3,453,022	$3,332,942	+ 3.60
Non-operating income	40,117	83,061	—51.70
Gross income	$3,493,139	$3,416,003	+ 2.30
Deductions:			
Rents	$477,793	$442,080	+ 8.10
Interest on funded debt	1,998,600	1,971,351	+ 1.40
Interest on unfunded debt	93,200	32,512	+186.90
Interest on income bonds (4%)	559,080	559,080	.....
Amortization of discount unfunded debt	48,785	39,411	+23.80
Other amortization items	30,000	.....	.....
Miscellaneous	39,257	38,917	+ 0.90
Total deductions from gross income	$3,246,715	$3,083,351	+ 5.30
Net income transferred to profit and loss	$246,424	$332,652	—26.00
Profit and loss surplus at beginning of year	362,370	1,066,988	—66.00
Profit and loss credits:			
Miscellaneous	19,958	26,825	—25.60
Account of released equipment by Md. Electric Railways	322,569	.....	.....
Gross profit and loss surplus	$951,322	$1,426,465	—33.40
Profit and loss debits:			
Dividends on common stock (*a*)	204,612	818,448	—75.00
Dividends on preferred stock (*b*)	920	920	.....
Contributions incident to war	23,176	35,575	—34.90
Adjustment of reserve for inquiries and damages	225,000	61,649	+265.50
Provision for uncollectible accounts receivable	30,586	17,000	+79.80
Income and excess profits taxes	86,221	105,035	—17.90
Welfare department deficit	31,004	.....	.....
Other miscellaneous debits	4,746	25,468	—81.30
Total profit and loss debits	$606,265	$1,064,095	—42.90
Profit and loss surplus at end of year	345,057	362,370	— 4.80

(*a*) $20,461,200 outstanding ($50 per share). (*b*) $23,000 outstanding ($50 per share).

City Seeks Ruling on Valuation

Judge A. G. Rutherford of the Davidson County Circuit Court at Nashville has granted the petition of the city of Memphis for a writ of certiorari to determine whether the Public Utilities Commission of Tennessee was warranted in including certain property items in the amount of investment upon which the Memphis Street Railway is entitled to earn a return.

The petition was filed by Walter Armstrong, city attorney of Memphis. The granting of this petition makes certain Mr. Armstrong's declaration of several weeks ago that the courts would be asked to interpret what property could be included in the rate base. The Utilities Commission allowed about $2,000,000 for superseded property, making the total $11,800,000, and then decided that the company was entitled to earn a minimum of 6½ per cent and a maximum of 7½ per cent on the whole.

STATISTICAL INFORMATION — UNITED RAILWAYS & ELECTRIC COMPANY OF BALTIMORE

	1919	1918	Percentage change + Inc. —Dec.
Total mileage—all track (including car house, etc.)	418	415	+ 0.72
Average—total miles operated (revenue track)	402	.....	.....
Car-miles operated	35,522,354	32,569,906	+ 9.08
Car-hours operated	4,115,068	3,778,054	+ 8.94
Ratio CM/CH (speed m.p.h.)	8.62	8.62	.....
Passenger traffic:			
Revenue passengers @ 5c	.....	159,091,243	.....
Revenue passengers @ 6c	168,304,855	51,397,867	.....
Revenue passengers @ 7c	7,566,154	.....	.....
Revenue passengers @ 6.5c. ticket	50,234,549	.....	.....
Commutation and special ticket	8,607,267	7,698,509	+11.82
Children and half fare	9,178,141	8,646,909	+ 6.15
Total revenue passengers	243,890,966	266,834,528	+ 7.14
Transfer passengers	86,756,575	81,879,968	+ 5.96
Other free passengers	5,348,708	3,174,014	+68.60
Total passengers	335,996,249	311,888,510	+ 7.70
Operating ratio (per cent)	67.20	62.40	+ 7.70
Car-mile statistics:			
Operating revenue (cents)	41.70	36.65	+13.78
Operating expenses (cents)	28.00	22.84	+22.59
Net income (cents)	0.69	1.02	—32.35
Passenger traffic (total)	9.47	9.59	— 1.25
Car-miles per revenue passenger	0.1458	0.1434	+ 1.67
Car-hour statistics:			
Operating revenue	$3.60	$3.16	+13.90
Operating expenses	$2.41	$1.97	+22.40
Net income	$0.06	$0.088	—31.85
Passenger traffic (total)	81.70	82.50	— 0.97
Taxes—Per cent of gross revenue	9.50	9.65	— 1.55
Per cent of net operating revenue	29.00	25.80	+12.40
Return earned on common stock	1.207	1.622	— 3.44
Depreciation reserve:			
Per cent of road and equipment value	0.972	0.793	+22.60
Per cent of operating revenue	5.00	5.80	.....

Binghamton Debts Being Paid Off

An agreement is reported under which the debts of the Binghamton (N. Y.) Railway, now in receiver's hands, are being paid. It is said that provision has been made for the return of the property to the owners within six months. From unofficial sources it is reported that the money for making these payments has been produced largely through the assistance of the bondholders of the Scranton Railway and the Scranton, Binghamton & Montrose Railway, which also control the Binghamton Railway. A statement says:

Richard W. Day, Scranton, with four others, also from Scranton, whose names could not be learned, heads the list of directors. The others include William H. Hecox, Addison J. Parsons, cashier of the First National Bank, Walter H. Morse, cashier of the City National Bank; Fred W. Ogden, of the Crocker-Ogden Company; Frank L. Fuller, Scranton and Binghamton; Thomas J. Keenan, attorney for Receiver Phelps.

The directors have elected these officers: President, Frank L. Fuller, re-elected; first vice-president, Richard W. Day, Scranton; second vice-president, Addison J. Parsons; secretary, William H. Hecox; treasurer, Elmer M. White.

It is said that G. Tracy Rogers, long identified with the affairs of the company, will no longer serve as a director. Mr. Rogers has many interests other than the railway. Moreover, he spends much of his time in New York City.

Municipal Bonds to Yield 6 Per Cent

Bonds that are an obligation of the city of Seattle, Wash., and a lien on the earnings of the Seattle Municipal Railway are being offered by R. M. Grant & Company, New York, N. Y., to yield 6 per cent. The interest rate is 5 per cent. The purchase of the bonds by investors is recommended by the bankers for the following reasons:

1. These bonds are an obligation of the city of Seattle and have been issued to provide funds for the purpose of making additions and betterments to and extensions of the existing Municipal Street Railway system.
2. The combined gross earnings of the Municipal Street Railway system and the traction lines acquired from the Puget Sound Traction, Light & Power Company average $3,854,720 for the five-year period 1915 to 1919, inclusive, equivalent to about four and one-quarter times annual interest requirements on all outstanding street railway bonds.
3. The lien of the interest and principal on the gross revenues before any deduction is made for operating, maintenance and depreciation has been confirmed by the Supreme Court of the State of Washington.
4. It is estimated that the total value of the street railway properties now owned by the city is in excess of $25,000,000.

Albany Road May Be Saved

A plan is being worked out to preserve the Albany (Ga.) Transit Company to the city. Dismantlement had been threatened. The Chamber of Commerce regarded this as out of the question. In consequence a proposal will be placed before the community in the interest of the city under which, summarized briefly, it is proposed:

1. To bond the property for not less than $50,000 and ask the people of Albany to take these bonds, the proceeds of the bonds to be used to defray the expense of rebuilding cars, making certain changes in the lines, discharging all obligations and leaving the property entirely debt free except for such bonded indebtedness as previously existed.
2. To make a belt-line system by joining the Tift Park line with the Hilsman Heights line and taking into the loop one of the two lines now running into the southwestern section of the city.

A New Form of Relief

Councilman A. H. Palmer of Akron, Ohio, has prepared an ordinance which provides for a bond issue of $1,000,000, with which he proposes that extensions to the city railway lines shall be built, since the Northern Ohio Traction & Light Company, owner of the local road, has announced that it is not in position to build extensions at the present time.

Under the Palmer plan the city would build the tracks and rent them to the company for a return large enough to cover the bond interest and create a sinking fund for the redemption of the securities. The company would be obligated to keep the tracks in repair and when its franchise is renewed four years hence it would be required to take over the extensions by purchase.

Mr. Palmer stated that his investigations show that the extensions would cost about $75,000 a mile and that the bond issue would thus provide for 13 miles of new track. In view of the fact that the company has stated that no extensions can be built unless a higher rate of fare is granted, he says he sees no other way out of the dilemma, as he feels that the people will not stand an increase in the fare. The question would have to be submitted to a referendum vote if approved by the City Council.

Financial News Notes

Electric Branch Abandoned.—The Boston & Maine Railroad has abandoned the 3 miles of electric railway known as the Northampton Branch. The tracks will be torn up, according to report.

$225,000 of New Stock Planned.—The Fitchburg & Leominster Street Railway, Fitchburg, Mass., has applied to the Department of Public Utilities of Massachusetts for permission to issue new preferred stock to the amount of $225,000.

Note Issue of $970,000.—Notice of new financing has been given to the holders of notes, bonds and stock of the Washington-Virginia Railway, Washington, D. C., in a circular advertising an issue of 6 per cent bond secured gold notes by the company to be known as series A, $850,000 notes, and series B, $120,000, the proceeds to be used to refund capital expenditures since 1910, and for the completion of the Camp Humphreys extension.

Keeps Up Fight on Dividend Increase.—Edward D. Barry filed a petition in Common Pleas Court on April 29 asking for an injunction to prevent the ordinance increasing the dividend of the Cleveland (Ohio) Railway from 6 to 7 per cent from going to a referendum vote. Mr. Barry won a victory in his first suit to prevent a referendum vote on the question. On April 19 Council again approved the dividend increase and adopted a resolution to submit the ordinance to a vote of the electors. This is the second time Mr. Barry has intervened.

Bond Extension Not Arranged.—The $185,000 of Gardner, Westminster & Fitchburg Railway first mortgage 5 per cent bonds due on Feb. 1, 1920, are now in default as to principal. The Feb. 1 interest was paid and the bondholders were notified that thereafter interest would accrue at 6 per cent, but no definite agreement as to the extension has been made. A meeting was held with a substantial portion of the bondholders, largely savings banks in the State of Maine, and acting upon the result of that meeting the matter is being carried along in an informal way. The road is included in the system of the Northern Massachusetts Street Railway.

Economies Being Suggested.—D. W. Henderson, general superintendent of the Seattle (Wash.) Municipal Railways, proposes changes in the municipal railway which he states will effect a total annual saving of $89,226. Mr. Henderson proposes to discontinue the operation of the Alki and Fauntleroy cars north of the Columbia Street loop on First Avenue and of the South Seattle cars north of Fourth Avenue and Jackson Street. He states that by turning the first two-named cars back at the Columbia Street loop he will save daily 72.50 car-hours. The cost of operating a car an hour is $2.70, and the shortening of the two lines would effect a daily saving of $196.50.

Serious Outlook for Westchester Line.—The Westchester Street Railway, White Plains, N. Y., may be forced to go out of business, according to a statement made on May 5 by Leveritt S. Miller, receiver. The company operates a line connecting White Plains, Tarrytown, Mount Vernon, New Rochelle and Mamaroneck. Mr. Miller was appointed receiver by Justice Morschauser, following an appeal to the court by the Farmers Loan & Trust Company, New York, trustee for the holders of $125,000 of bonds. The company has a power house and carhouse in White Plains on the Bronx Parkway. The land was condemned, but the commissioners extended the lease of the property where the power house and carhouse were situated. The lease has now expired and a renewal has been refused. The city authorities also refuse to allow another power house or carhouse to be built in White Plains. Unless they can be put up, Mr. Miller said, there would be nothing to do but abandon the line.

Traffic and Transportation

Publicity Plays a Part

Halifax Company Conducts Advertising Campaign in Behalf of Higher Fare

"Tell it to the people." This is the motto of the Nova Scotia Tramways & Power Company, Halifax, N. S. It's some motto, too. Just now the company looks to it to win something dear to the heart and near to the pocket of almost every electric railway—an increase in revenue.

The Nova Scotia system needs more money. There is nothing very remarkable or very original in that. The company has applied to the powers that be—in this case the Nova Scotia Legislature—for higher fares. But it has not rested its case with the Legislature and let it go at that. It realizes the force that lies in public opinion. It knows that to obtain a higher fare and to enjoy it to the full after obtaining it, it must have the support of its patrons. It knows, moreover, that legislators like their jobs and, therefore, are anxious to "stand in" with the folks back home. So the tramways officials are laying the facts before the Halifax public. They are "telling it to the people."

Large advertisements outlining the company's situation are appearing in the Halifax dailies, the *Chronicle* and the *Echo*. The man who writes the ads believes in using short words and sentences with a "punch." He does not consider it necessary to call calculus, Greek or Einstein's theory to his aid. In simple and understandable fashion the ads lay the facts before the public. Incidentally, said public is learning a lot it never knew before about economics, and is being set right regarding watered stock and other bugaboos. The best of it is that the instruction is free. If the people decide to come across with a 2-cent fare increase, so much the better.

Says the company in one of these talks on economics:

Suppose a dozen years ago you had invested all you owned in an office building in Halifax. You had determined that the rentals would pay the expense of caring for it and give you something over for your time and something for the use of your money.

The building was in fine condition and was called "modern" then. Your tenants were contented with the rates, and the steam heat and lighting arrangements and the elevator service.

Then suddenly the times began to change. Your taxes doubled, the price of coal doubled, and your tenants began to complain of the slow old elevator which seemed to have a way of getting out of order at the most inconvenient time.

The roof leaked and a new one was needed. Many of the rooms required replastering. The stores downstairs demanded up-to-date show windows in place of the dinky little ones which were in vogue twelve years ago.

Of course you anticipated some of these things when you bought the building, but your estimates showed you could pay for them out of rentals.

Then all at once you find that your dollar—just like every one else's dollar—will buy only about half as much as it did then, and that so great is this shrinkage that you don't take in quite enough money to pay running expenses and taxes to say nothing of those repairs and the profit which you counted on for your old age.

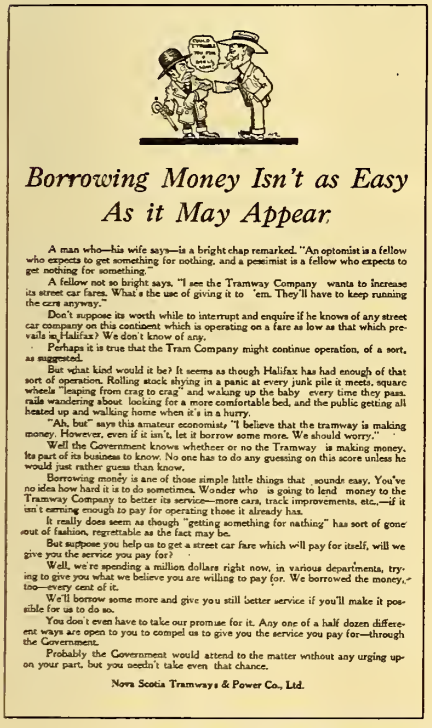
How are you going to keep up that building, put in that new elevator and make those changes? Where is the money coming from? All that you have is what your tenants pay you, and that isn't enough.

No, you can't raise the rent. A law, made to meet conditions when you purchased that building—when a dollar was worth 100 cents—says you can't.

Wouldn't you get your tenants together some day and say: "Boys, I'm up against it. I'm paying out more on this building than you are giving me for the use of it. The only money I have to spend is what I get from you. I know just as well as you do that we have long needed a new elevator, and a new roof, and new show windows, and new plaster, and a lot of new things. Because I think I know you all to be fair I've taken a chance. I've borrowed the money with which to do some of these things and they are already under way. I hope we can turn this old building inside out and make it a credit to the street. I know you will be perfectly willing to pay me what it costs me to house you. When you have done that I can borrow more money and finish the job, and I will finish it. More than that, I am depending upon you to help me get that old law—perhaps just and reasonable in its time—amended to fit the scrambled conditions of today. And I don't think you are going to prove my judgment wrong."

Isn't that about what you would do?

It's what the tram company is doing anyway.



Borrowing Money Isn't as Easy As it May Appear

A man who—his wife says—is a bright chap remarked. "An optomist is a fellow who expects to get something for nothing, and a pessimist is a fellow who expects to get nothing for something."

A fellow not so bright says, "I see the Tramway Company wants to increase its street car fares. What's the use of giving it to 'em. They'll have to keep running the cars anyway."

Don't suppose its worth while to interrupt and enquire if he knows of any street car company on this continent which is operating on a fare as low as that which prevails in Halifax? We don't know of any.

Perhaps it is true that the Tram Company might continue operation, of a sort, as suggested.

But what kind would it be? It seems as though Halifax has had enough of that sort of operation. Rolling stock shying in a panic at every junk pile it meets, square wheels "leaping from crag to crag" and waking up the baby every time they pass, rails wandering about looking for a more comfortable bed, and the public getting all heated up and walking home when it's in a hurry.

"Ah, but" says this amateur economist, "I believe that the tramway is making money. However, even if it isn't, let it borrow some more. We should worry."

Well the Government knows whether or no the Tramway is making money. Its part of its business to know. No one has to do any guessing on this score unless he would just rather guess than know.

Borrowing money is one of those simple little things that sounds easy. You've no idea how hard it is to do sometimes. Wonder who is going to lend money to the Tramway Company to better its service—more cars, track improvements, etc.,—if it isn't earning enough to pay for operating those it already has.

It really does seem as though "getting something for nothing" has sort of gone out of fashion, regrettable as the fact may be.

But suppose you help us to get a street car fare which will pay for itself, will we give you the service you pay for?

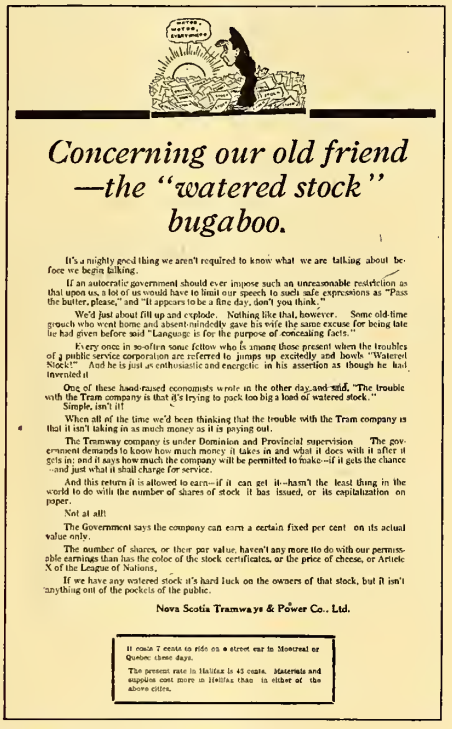
Well, we're spending a million dollars right now, in various departments, trying to give you what we believe you are willing to pay for. We borrowed the money, too—every cent of it.

We'll borrow some more and give you still better service if you'll make it possible for us to do so.

You don't even have to take our promise for it. Any one of a half dozen different ways are open to you to compel us to give you the service you pay for—through the Government.

Probably the Government would attend to the matter without any urging upon your part, but you needn't take even that chance.

Nova Scotia Tramways & Power Co., Ltd.



Concerning our old friend —the "watered stock" bugaboo.

It's a mighty good thing we aren't required to know what we are talking about before we begin talking.

If an autocratic government should ever impose such an unreasonable restriction as that upon us, a lot of us would have to limit our speech to such safe expressions as "Pass the butter, please," and "It appears to be a fine day, don't you think."

We'd just about fill up and explode. Nothing like that, however. Some old-time grouch who went home and absent-mindedly gave his wife the same excuse for being late he had given before said "Language is for the purpose of concealing facts."

Every once in so often some fellow who is among those present when the troubles of a public service corporation are referred to jumps up excitedly and howls "Watered Stock!" And he is just as enthusiastic and energetic in his assertion as though he had invented it.

One of these hand-raised economists wrote in the other day and said, "The trouble with the Tram company is that it's trying to pack too big a load of watered stock."

Simple, isn't it!

When all of the time we'd been thinking that the trouble with the Tram company is that it isn't taking in as much money as it is paying out.

The Tramway company is under Dominion and Provincial supervision. The government demands to know how much money it takes in and what it does with it after it gets in; and it says how much the company will be permitted to make—if it gets the chance—and just what it shall charge for service.

And this return it is allowed to earn—if it can get it—hasn't the least thing in the world to do with the number of shares of stock it has issued, or its capitalization on paper.

Not at all!

The Government says the company can earn a certain fixed per cent on its actual value only.

The number of shares, or their par value, haven't any more to do with our permissable earnings than has the color of the stock certificates, or the price of cheese, or Article X of the League of Nations.

If we have any watered stock it's hard luck on the owners of that stock, but it isn't anything out of the pockets of the public.

Nova Scotia Tramways & Power Co., Ltd.

It costs 7 cents to ride on a street car in Montreal or Quebec these days.

The present rate in Halifax is 45 cents. Materials and supplies cost more in Halifax than in either of the above cities.

FARE ADVERTISEMENTS OF HALIFAX COMPANY

A bill has been introduced in the Provincial House of Assembly which proposes to allow the company to raise its cash fare from 5 cents to 7 cents. The measure calls for the sale of four tickets for 25 cents and sixteen for 90 cents. It also provides that the company shall not be required to use a paving material more expensive than that used by the city. Under the terms of the measure the Board of Public Utilities would have jurisdiction over the rates to be charged by the company. At present rate regulation is the prerogative of the Legislature.

Suit to Restrain City in Fare Case

The Galveston (Tex.) Electric Company has filed a bill in equity in the United States District Court for the Southern District of Texas at Houston seeking to enjoin the 5-cent fare ordinance promulgated by the city of Galveston on June 1, 1919. Relief is sought through the same channel as that employed by the Houston Electric Company, which recently won its fight for an equitable valuation and fair return thereon when Special Master Otis Hamblen fixed $6,000,000 as a just valuation of the company's properties and held that it should be allowed to earn 8 per cent on this value.

The bill filed by the Galveston Electric Company sets forth that for the months of January, February and March of 1920, the latest figures available, the company earned at the rate of less than 1 per cent per annum on its invested capital, and that for the year 1919, during which a 6-cent fare was in effect for a period of five months, the company earned only 2 per cent on the value of its railway property. It is alleged that the present fare is confiscatory. The company seeks to enjoin the city from enforcing the 5-cent fare ordinance.

The Galveston City Commission in 1918 passed an ordinance authorizing the company to charge 6-cent fares and requiring it to pay to the city a tax of 1 per cent of its gross receipts. The measure was later repealed.

Fare Measure Passed

Sliding Fare with Seven-Cent Maximum Approved by Voters of St. Paul —Control by Council

Voters of St. Paul, Minn., have approved the ordinance to permit a sliding scale of fares upon the St. Paul City Railway, included in the Twin City Rapid Transit System, if the City Council determines the situation requires it. In short, the ordinance brings the franchise measurably under the regulations of the city charter and the service and fare under the control of the City Council.

While the measure just passed provides that the Council shall have the right to fix fares, still its right in this respect is limited to the granting of a rate of not more than 7 cents per passenger. In no event is the company to receive a rate in excess of the present 5-cent fare until it has built and put in operation sufficient cars to furnish the service prescribed by the ordinance.

The St. Paul *Dispatch* considers the result of the vote surprising in view of what had seemed to be the public temper toward the company and all of its work. That paper says that the vote is interesting if it is to be interpreted as a decision to demand the kind of service everybody wants and to sanction a higher fare to pay for the service.

Socialist Defeated

Commissioner F. L. Powers, who drew the ordinance, was defeated for reelection. Socialism was the issue, and the rampant candidate of the Socialists for Mayor was defeated by the present Mayor, L. C. Hodgson, who will have the deciding vote in the Council.

The committee for better street railway service explained in the advertisements which it carried to influence the voters in favor of the new measure that the franchise amendment meant that the city would be empowered to compel the railway immediately to supply the full and proper service required by the citizens of St. Paul and make any additions and extensions to present trackage that might be necessary to complete such service. It was further explained that the city was also empowered to regulate the fare charge when such improved service was completed. The proposed amendment follows:

Sec. 1. That Section 13 of Ordinance No. 1227, entitled "An ordinance authorizing the St. Paul City Railway Company to construct, equip, maintain and operate street railway lines in the city of St. Paul," approved Sept. 20, 1889, be and the same is hereby amended to read as follows:

"Sec. 13. The Council of the city shall have the right, power and authority to regulate, fix and control reasonable rates of fare to be charged by said grantee for carrying passengers on any of its lines within said city, provided that the Council shall not have the right to fix, nor the said St. Paul City Railway Company the right to receive, a rate of fare in excess of 7 cents for each passenger, with his ordinary baggage, traveling on any of said lines, and upon the payment of his fare such passenger shall be entitled to a transfer as provided in Section 14 hereof; and provided, further, that in no event shall the said grantee be entitled to receive a rate of fare in excess of the present 5-cent fare until said grantee has built and put in service sufficient cars to furnish, and is actually furnishing, the service prescribed by the ordinances of said city; and provided further that no fare shall be required for a child under five years of age while traveling in the care of an older person, and that when the same car travels over two or more streets or lines there shall be but one fare for the whole distance so traveled."

Sec. 2. This ordinance shall not be effective for any purpose unless the said grantee shall accept the same, in writing, within thirty days from the passage and publication thereof, nor unless within said time said grantee shall also agree in writing, that the franchise and privileges conferred by said Ordinance No. 1227, together with any modifications thereof, including the foregoing amendment, shall be held and used subject to all the conditions and limitations in the city charter prescribed. In view of the fact, however, that said grantee does not now pay any gross earnings tax, and because such gross earnings tax tends to increase fares, and therefore must be paid by persons using the lines of said grantee, the grantee, its successors and assigns are hereby specifically relieved from the payment of 5 per cent of the gross earnings of said grantee.

Sec. 3. This ordinance shall take effect and be in force from and after its passage and publication, and the acceptance thereof by the grantee and the filing by said grantee in the office of the city clerk of the agreement aforesaid, in a form to be approved by the Corporation Counsel of said city, and after the same shall have been approved at a general or special election by an affirmative majority of the qualified electors of said city of St. Paul voting thereon.

Aid of Courts Invoked

Developments have followed fast in the Staten Island fare fight. As noted in the ELECTRIC RAILWAY JOURNAL for May 8, page 959, the strike of the trainmen employed by the Richmond Light & Railroad Company was settled on May 5 and service resumed on May 6 under an order from Public Service Commissioner Nixon permitting an 8-cent fare with strips of tickets at ten for 75 cents.

The city has been prohibited from interfering with the service by an order from Judge Thomas R. Chatfield, Federal District Court. This aroused the ire of the representatives of the city of New York. Mayor Hylan attacked Commissioner Nixon for permitting the increase in fare. F. H. La Guardia, president of the Board of Aldermen, suggested that Mr. Nixon be removed from office by Governor Smith. He urged the Corporation Counsel to obtain a writ of prohibition applying to other lines in the city.

The city did obtain an order restraining Mr. Nixon from considering any application from the Staten Island Midland Railway for permission to increase its fares. This company suspended operation some months ago on the ground that it was losing money at a 5-cent fare. When this case came before the court, on May 11, Terrence Farley, counsel for Mr. Nixon, asked a postponement until May 17 so as to prepare an adequate defense. Mr. O'Brien, for the city, said that Mr. Nixon never should have granted permission to the Staten Island company to increase the fare unless he had previously studied the situation thoroughly. This writ of prohibition and a plea to prevent the Richmond Light & Railroad from charging an 8-cent fare will accordingly come before the court on May 17.

New Zones Work Well

Connecticut Company Installs Modified Zone System Ordered by Utilities Commission

New zone fares were introduced on the lines of the Connecticut Company on May 9 in accordance with the recent order of the Public Utilities Commission of Connecticut modifying the system as adopted originally by the company itself. Employees of the company had been coached for some time to answer all questions about the new conditions, and zone markers were put up at all new limits along the line to help the public to understand the change. In consequence, there was a minimum of delay and confusion.

Under the new arrangement it costs 3 cents a mile to ride if payment is made in cash. With the zone ticket the passenger can travel for 2 cents a mile with a minimum collection of three zones punched on his ticket. The commuter rides for 1¾ cents a mile on a commutation ticket, which is a new form of payment under the Utilities Commission order. All zones approximate a mile in length.

Ticket Sales Arranged

The company has ruled that if the end of any line is ⅜ of a mile or more beyond the last zone point, this distance will be called an additional zone, and will cost the passenger 2 cents more if he has a ticket or 3 cents if he pays cash. If the distance is less than ⅜ of a mile from the end of the line to the last zone point no extra fare is charged. Tickets are sold at a reduction of 33⅓ per cent from the cash rate.

The monthly commutation ticket sold at the rate of 1¾ cents per zone is good only between the traffic centers of cities having a population of 25,000 or over and points more than five zones distant on lines radiating therefrom. These tickets are good for two rides daily except Sundays and legal holidays for the person for whom they are issued.

The order of the commission in connection with this fare change was reviewed at length previously in the ELECTRIC RAILWAY JOURNAL for April 10, page 777.

Upholds Paving Exemption

The Massachusetts Department of Public Utilities has dismissed the petition of the city of Melrose which sought to require the Eastern Massachusetts Street Railway to change the grade of its tracks and install new paving in that city. Under the old street railway law, the street railway companies were obliged to pave between the tracks and 18 inches outside the outer rails. The public control act relieved the company from this burden until two years after peace was declared. There was a provision, however, that the Public Utilities Commission might be appealed to to compel the railway to pay a part of the cost of such work.

Baseball Scores, Cincinnati Fans —and Trolley Fares

All Cincinnati is boosting for the Reds—the Cincinnati Reds, of course. That of itself isn't so remarkable, perhaps, in view of the record Pat Moran's ball-tossers made against the White Sox in last year's World's Series. But Cincinnati, at least that part of it that "trollies," now has a particular reason for wanting the home team to score on all comers. That reason is this: If the Reds play championship ball between now and the beginning of June, car fares will stay down. If they fail to live up to their reputation as scorers, fares will probably go to 7½ cents on June 1.

The Cincinnati Traction Company must have more revenue. It has two ways of getting it: an increase in fare or—more riders. Cincinnati prefers the latter way. If the Reds play like champions, large crowds will attend the games and incidentally will swell car receipts. In that case there will be no need of a fare increase. From the way Hod Eller is twirling 'em these days it looks as if the fare would stay put.

W. C. Culkins, city street railway director, is watchfully waiting. Meanwhile he is turning over in his mind the fact that the traction system lost $17,000 in March and that April saw a further increase in operating costs. In a report submitted to Mr. Culkins by the company the gross earnings in April are given at $706,053 as against $713,915 in March. The decrease was largely the result of the inclement weather and the coal situation.

As a means of economy Mr. Culkins advised the company that he would investigate the feasibility of using gas in place of coal during the summer months. He advised the company also to make better arrangements with the Union Gas & Electric Company for power. Mr. Culkins said that the power supplied at present was inadequate.

Of course, the great majority of the car riders do not care a whoop about these figures. What they do care about is how much it costs them to ride in the cars. They don't want to have to hand over half a cent more every time they pass the conductor. So, naturally, they want the Reds to win. If they failed to back the home team they wouldn't be loyal Cincinnatians—or street-car riders.

Decision Against City Buses

The Appellate Division in Brooklyn, N. Y., on May 10 handed down a decision sustaining the ruling of Justice Cropsey that the municipal buses had no legal right to run in the streets of Brooklyn in competition with the lines of the Brooklyn City Railroad.

The opinion was written by Justice Blackmar, all the other Justices concurring. The court maintains that the city of New York has no power or authority to operate bus lines or stage lines in the streets except by legislative grant. The opinion states, however, that the city can grant franchises to privately owned corporations.

The opinion also holds that no emergency to continue the operation of the bus lines is shown at present.

Subsequently the Appellate Division authorized the Corporation Counsel to appeal to the Court of Appeals from its decision sustaining Justice Cropsey in issuing an injunction restraining the operation of three lines of municipal buses in Brooklyn. The Appellate Division then granted to the city a stay which allows the buses to continue in operation at least until the Court of Appeals hands down its decision. In issuing the stay the court directed that the appeal be taken as soon as practicable.

Modification of Transfers Sought

The Dallas (Tex.) Railway has asked John W. Everman, Supervisor of Public Utilities, for authority to change the transfer system with a view to correcting some of the abuses now evident in Dallas. The company desires to institute a transfer showing only the line of origin and good for passage within fifteen minutes from time of issue on any lines going in the same general direction as the line from which the transfer was issued. Under the system now in force transfers of different color are used for different cars. The transfers indicate the line of origin and also the line on which they will be honored. Present transfers are good for one continuous passage on next car leaving point of transfer, but transfer tickets are frequently used hours after their issue. Under the proposed system the date punch would be eliminated. The time stamp would, however, be placed on the front of the transfer in bold lettering and the transfer would become void if not used within fifteen minutes from time stamped.

Rhode Island Accepts the One-Man Car

The petition of the Newport & Providence Railway, Newport, R. I., to operate one-man safety cars in Newport, Middletown and Portsmouth to Bristol Ferry was granted in a decision rendered by the Rhode Island Public Utilities Commission on May 12. An order was entered by the commission empowering the company to put the cars in operation at once.

The commission takes cognizance of the bus lines in Providence and says that its observation of the operation of these buses leads it to believe that one-man safety cars can be operated with full protection and safety of the passengers and without undue hardship to the persons operating such cars.

The Newport & Providence Railway is the only electric railway in the State not in the hands of a receiver and the first company to operate one-man cars in the State. This company made an attempt to operate one-man cars about five years ago, but the town of Middletown blocked the move by passing an ordinance preventing the operation of cars in the town unless manned by two men. On an appeal to the Utilities Commission, the petition was subsequently dismissed.

The petition upon which the decision is made was filed more than a year ago. It was opposed by the city of Newport and the town of Middletown. The Providence division of the Amalgamated Association also appeared and opposed it, declaring that the cars were not safe.

The decision of the commission, reviewing the petition, discusses particularly the safety features which have been introduced in the operation of such cars during their development.

Transportation News Notes

Five Cents Straight in Cleveland.—A straight 5-cent fare is now in effect in Cleveland, Ohio. The City Council on May 10 passed an ordinance authorizing the Cleveland Railway to charge the flat 5-cent rate. This action was taken following the settlement of the differences between the company and its employees. The fare was formerly 5 cents cash or six tickets for 25 cents.

Service Restored in Weymouth.—Service was recently restored on the Weymouth line of the Eastern Massachusetts Street Railway, Boston, Mass. The Weymouth voters have appropriated the sum of $28,000 to enable the company to resume operation. One-man cars will be operated up to June 1, 1921. Motor buses will replace the electric cars on the Pleasant Street line. The Weymouth division will be in charge of a "home rule" committee appointed by the selectmen.

One-Man Cars for Brantford.—The Brantford (Ont.) Municipal Railway has decided to equip the system with one-man cars. The decision was hastened by a demand for more money from the employees. The city proposes to reduce the number of men employed so as to be able to pay the new scale of wages. The employees at present receive from $23 to $35 a week. In January last the city voluntarily increased the pay 2 cents an hour.

More Trailers for St. Louis.—The United Railways, St. Louis, Mo., will add six trailer cars to its service for each of eight weeks, beginning Nov. 1 of this year, under the terms of an order issued on May 5 by the State Public Service Commission. The order provides for the addition of fifty trailers. Some time ago the commission issued a similar order obligating the company to add two trailers a week from May 1 until fifty had been added. The company asked for an extension,

contending that it would be impossible to add the requisite number of cars in the allotted time. After a hearing upon the matter the commission entered its new order.

Safety Cars for La Crosse.—One-man safety cars will soon be operating in La Crosse, Wis., as the result of an agreement between the La Crosse City Council and the Wisconsin Railway, Light & Power Company, which owns the local trolley system. The company recently informed the municipal authorities that it needed an increase in revenue and that it might have to raise fares above the present 6-cent level. It proposed to cut down expenses by introducing one-man cars on the local lines. To this proposal the City Council objected. Later, however, the Council met in special session and withdrew its objection to the use of "safeties." Eight of the cars will be placed in service in the course of the next few months.

Asks Eight Cents on B. R. T.—Lindley M. Garrison, receiver of the New York Consolidated Railroad (Brooklyn Rapid Transit System), has applied to Public Service Commissioner Lewis Nixon of the First District of New York for permission to charge an 8-cent fare on the company's lines. Mr. Garrison proposes to put the higher rate into effect on thirty days' notice. The New York Consolidated Railroad operates certain of the Brooklyn subway and elevated lines under lease from the New York Municipal Railway, which made the dual system contract No. 4 with the city. In this contract the fare is fixed at 5 cents. In notifying Mayor Hylan of the fare application, Commissioner Nixon stated that, since the company is operating the subways under the terms of a municipal lease, the commission would take no other action at present than to receive the application and place it on file.

Dan Fisher's New "Texas Siftings."—Dan Fisher is in action again. That isn't so unusual, of course, because he is doing something or other pretty much all the time. But he generally has time to tackle just one more job, especially if it is on speaking terms with the writing game. That is his nature. First it was *O. K.'d Copy*. Now it's *Partners*. *Partners* is Dan's particular hobby these days, which means that it has more kick to the square inch than anything else in the State of Texas, except Dan himself. Dan lives in Dallas. He works for the Dallas Railway. Wherefore *Partners*. *Partners* is of and for the Dallas Railway and it is by Dan. So far three issues have been received. One might go on and describe those issues—"Cotton Patch," "Chimney Corner" and all. That would convey no more idea of how good *Partners* is than it would be if one said that each issue is 9 in. x 6 in. You must read *Partners* to appreciate it. Write to Dan for your copy. You'll be well repaid. A half hour with *Partners* is the next best thing to a talk with Dan in person.

Personal Mention

T. B. MacRae has been appointed auditor of the Chicago & Interurban Traction Company, Chicago, Ill.

Ray Rushton, president and receiver of the Montgomery Light & Traction Company, Montgomery, Ala., has announced his candidacy for the short term of the United States Senate.

Sigourney B. Olney has been appointed secretary of the Brooklyn (N. Y.) City Railroad. Mr. Olney is a Harvard graduate and a member of the law firm of Cullen & Dykman, New York, N. Y.

H. F. Mayer, auditor of the Kansas City (Mo.) Railways, has resigned to accept a position with the National City Company, New York, N. Y., as manager of the investment department.

Henry J. Ford, professor of politics at Princeton University, has been appointed to membership in the Interstate Commerce Commission to succeed James S. Harlan, whose term expired on Dec. 31, 1918.

Charles W. Halley has been named Deputy Public Service Commissioner for the First District of New York. Mr. Halley succeeds Edward J. Glennon, who has been appointed a Justice of the State Supreme Court.

K. B. Leavitt, superintendent of shops and rolling stock of the Northern Ohio Traction & Light Company, Akron, Ohio, has resigned to become a sales representative of a manufacturer of automobile specialties.

James Duncan, first vice-president of the American Federation of Labor, has been appointed a member of the Interstate Commerce Commission. Mr. Duncan is president of the Granite Cutters' International Association.

A. B. Cole, who has resigned as general passenger and freight agent of the Monongahela Valley Traction Company, Fairmont, W. Va., was recently presented by his fellow employees with a fountain pen and a leather traveling case.

Major-General E. H. Crowder, Provost Marshal of the United States Army during the war, has been invited to become the city member of the board of control of the Kansas City (Mo.) Railways to fill the vacancy caused by the resignation of R. P. Woods.

Britton I. Budd, president of the Chicago (Ill.) Elevated Railways and the Chicago, North Shore & Milwaukee Railroad, has been elected president of the Chicago & Interurban Traction Company, a 52-mile line extending from Chicago south to Kankakee, Ill.

G. W. Jones has been appointed treasurer of the Brooklyn (N. Y.) City Railroad. Mr. Jones became connected with the Brooklyn City lines as auditor when the system resumed independent operation several months ago. He was formerly associated with Sanderson & Porter, engineers, New York City.

M. D. Bartlett, trainmaster for the lines of the Connecticut Company, New Haven, Conn., formerly operated under the name of the Shore Line Electric Railway, has resigned to enter business for himself. Mr. Bartlett has been connected with electric railways in the East for the past twenty-five years.

George H. McMullin has been made superintendent of the Southern Division of the Northwestern Pacific Railroad, San Francisco, Cal. In this capacity Mr. McMullin will have charge of the operation of all of the road's properties south of Willitts. Mr. McMullin has been with the Northwestern Pacific for thirty years, most recently as assistant to W. J. Hunter, superintendent of the Northern Division.

Mark W. Potter, president of the Carolina, Clinchfield & Ohio Railway, has been appointed to the Interstate Commerce Commission. Mr. Potter will retire from steam railroad work and also from the private practice of law as a member of the firm of Hornblower, Miller, Garrison & Potter of New York City. He will withdraw also from participation in other varied interests, including promotion and development of the town of Kingsport, Tenn. This is the first occasion in which a man experienced in railroad management has been appointed to the commission. Mr. Potter's appointment has called forth much favorable comment from the press.

William C. Markham, former assistant engineer of the Public Service Commission for the First District of New York, has been appointed chief engineer of the Detroit (Mich.) Municipal Railways in charge of the construction of the new city-owned electric railway lines authorized by the $15,000,000 bond issue approved by the voters on April 5. Mr. Markham was graduated as a civil engineer from Rensselaer Polytechnic Institute in 1904. From 1905 to 1909 he was superintendent of construction on various building projects, including the Kent Avenue power house, Brooklyn, N. Y., and the Waterside power station of the New York Edison Company. In 1909 he supervised the construction of electric railway lines in Washington, D. C. After acting as superintendent of construction for the United States Government until 1913, he became assistant engineer for the Public Service Commission of New York City, in which capacity he was engaged mainly on subway construction.

Promotions for Los Angeles Officials

E. L. Lewis, General Superintendent, Made Assistant to the General Manager—F. H. Van Vranken and G. B. Anderson Advanced

Three promotions affecting the personnel of the Los Angeles (Cal.) Railway were recently announced by G. J. Kuhrts, general manager. E. L. Lewis, general superintendent, assumes the newly created office of assistant to the general manager. F. H. Van Vranken, assistant to the general superintendent, is advanced to the position of general superintendent, left vacant by the advancement of Mr. Lewis. George B. Anderson, director of public relations, becomes manager of service with jurisdiction over the system's employees in the matters of training and the maintenance of discipline.

EDWIN L. LEWIS, who becomes assistant to the general manager, has been in the service of the Los Angeles traction system since 1888. Mr. Lewis was born in Osceola, Mo. For four years following his graduation from public school he acted as deputy tax collector and county treasurer. In 1887 he went to San Francisco, where he obtained employment with the local traction system as a conductor. After spending several months at this work he went to Los Angeles, entering the employ of the Los Angeles Cable Railway as a clerk.

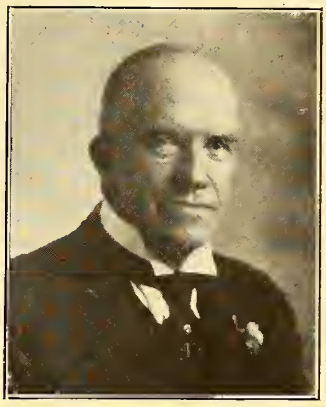
In August, 1890, Mr. Lewis was made chief clerk to the superintendent of the company. Upon the consolidation of all the lines in the city the latter official, assisted by Mr. Lewis, took charge of the operation of the entire system. In 1902 Mr. Lewis was made assistant superintendent. He continued in that position until 1913, when he was appointed general superintendent.

F. H. Van Vranken, the new general superintendent, was born in Schenectady, N. Y., in 1865. At the age of nineteen he became a brakeman with the Southern Pacific lines. He served the Southern Pacific successively as brakeman, freight conductor, yardmaster and passenger conductor. In 1902 he was appointed division superintendent of the Pacific Electric Railway, continuing in that capacity until 1911, when he resigned to join the Los Angeles Railway as assistant superintendent. Two years later his title was changed to assistant to the general superintendent. He continued to serve in the latter capacity until receiving his new appointment.

George B. Anderson, appointed manager of service, is a native of Amsterdam, N. Y. Mr. Anderson, who is a veteran newspaper man, joined the Los Angeles Railway as publicity agent in October, 1917. Soon after his appointment he established the department of public relations. His jurisdiction was gradually extended to include other work of a supervisory nature. The position of manager of service was recently created for him. In his new capacity he has charge of instruction, discipline, investigation, complaints, public relations and welfare. Since assuming his new duties he has established a merit system for trainmen.

F. H. VAN VRANKEN

E. L. LEWIS



G. B. ANDERSON

New Officials for Des Moines Companies

S. G. Harris has been elected president of the Des Moines (Iowa) City Railway and the Inter Urban Railway, Des Moines, succeeding Emil G. Schmidt, resigned.

F. C. Chambers, formerly electrical engineer for these two companies, has been appointed vice-president and general manager of the Des Moines City Railway, and co-receiver with Homer A. Miller, president of the Iowa National Bank, Des Moines, the property having been in a receivership for the past six months. Mr. Chambers also becomes vice-president and consulting receiver of the Inter Urban Railway.

Will Clapper has been chosen vice-president and general manager of the Inter Urban Railway.

E. B. Bieghler, who has been connected with the city lines for several years, has been appointed assistant treasurer of both the local and the interurban companies.

E. W. Miller, formerly assistant superintendent of transportation, is made superintendent of transportation.

Mr. Harris has been connected with the corporation department of the Harris Trust & Savings Bank, Chicago, for the past eight years, and assumes the presidency of the Des Moines companies as an additional duty. He is a native of Chicago and a graduate of Yale University, class of 1912.

Operator Becomes Consultant

Thomas W. Connette, whose resignation as superintendent of transportation of the International Railway, Buffalo, N. Y., was announced in the ELECTRIC RAILWAY JOURNAL for April 24, has gone into business for himself as a railway industrial engineer. Mr. Connette has opened offices in the Electric Building, Buffalo. A company is now being formed, with Mr. Connette as its president, for the purpose of conducting a consulting engineering practice.

The work which Mr. Connette has undertaken includes the making of valuations and traffic surveys, the rerouting of car lines and the rebuilding of schedules to the best advantage. The new organization is affiliated with the Standard Business Training Institute, which trains men for various occupations, and will therefore be in a position to furnish men for the various branches of electric railway work.

Chinese Traction Operators Here

Peter Hing, general manager, and Y. M. Chu, assistant engineer of the Kwongtung Tramway, Canton, China, are now in this country for the purpose of purchasing motor buses and railway equipment. The Kwongtung Tramway was organized in August, 1919, for the purpose of constructing and operating an electric railway system in the city of Canton. Both Mr. Hing and Mr. Chu were educated in North America, the former at McGill University and the latter at the Massachusetts Institute of Technology.

Manufactures and the Markets

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

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Safety Tread Manufacturers Making Fine Deliveries

Despite Increased Labor and Material Costs Prices Show Only a Moderate Advance—Accident Expense Reduction Justifies Larger Purchases

Adverse transportation conditions have had little effect on the safety tread market, notwithstanding the fact that manufacturers have encountered delays in receiving raw material. Electric railways and car manufacturers are not purchasing this class of products in very satisfactory volume at present, although in some quarters increased inquiries are noted over last year. The ability to make shipments inside of a week is not confined to a single maker of safety treads, and factory stocks of lengths ready to be cut up are reported in good quantity. Some railways are ordering for delivery six to eight weeks hence and prompt shipments on the agreed dates are being made and appreciated. These shipments are the result of far-sighted buying of raw material and of good accumulations of stocks of this at the factories. One manufacturer has 33 tons of lead on hand at the moment, or enough to carry him a month in production; he is buying special rolled steel four to five months ahead and lead for delivery two months hence. Eight carloads of steel are reported to be on hand in the factory, which can now produce about 1,500 ft. of treads per day.

Demand continues to be subdivided among competitive makes of tread, and shipments are being made for railway station, building and rolling stock use. Car builders are also in the market, but not to an extent that is wholly satisfactory from the tread-makers' viewpoint. A large Eastern electric railway purchases from 6,000 to 10,000 ft. of tread per year, including renewal buying, and orders from this source, according to one manufacturer, help to stabilize conditions; but too few companies appear to realize that the expenditure of more money for safety treads might help to decrease the total outlay for accidents and pay a handsome return upon the investment. The use of such equipment is not required by public utility commissioners to any extent, apparently, and yet the legal and physical phases of step usage deserve consideration from the point of view of accident prevention.

Production costs have risen in this field, but it is fair to state that selling prices have not advanced in proportion. One well-known maker declared recently that on account of the specially fabricated material required, his own costs were about 66⅔ per cent for material and 33⅓ per cent for labor. Within the year this market has advanced wages 15 per cent, but at present his prices are only about 5 per cent above those of 1918. Another maker, producing a type of tread in which cast iron treated with an abrasive forms the unit surface, has been obliged to pay premiums for the delivery of material, and labor advances have caused two price increases of 10 per cent each since Jan. 1, the last occurring during the present week. In this case labor and overhead account for two-thirds of the cost. In 1915 a going price for safety treads of this type was about $1.25 per square foot, compared with $1.60 today. Another maker, selling a tread involving the use of lead and steel, quotes around $1.40 to $1.50 per square foot, compared with about $1.25 to $1 before the war.

United Railways to Buy 120 Cars

Sixty Motor Cars, Fifty Trailers and Ten Safeties Authorized for St. Louis By District Court

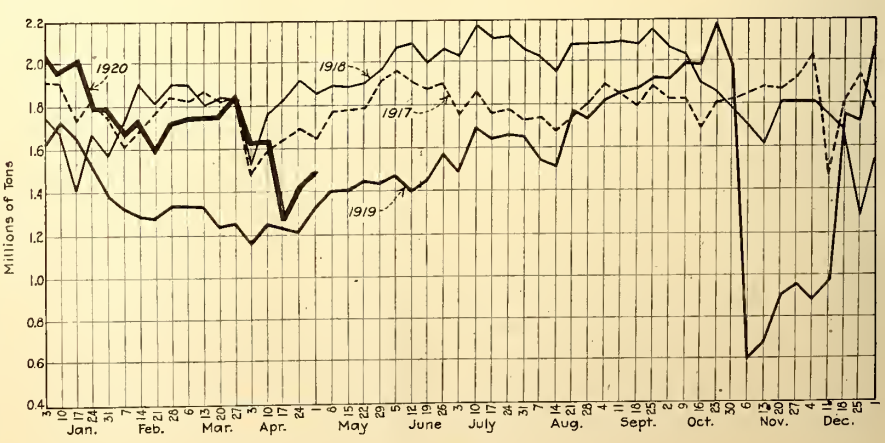
United Railways of St. Louis, Mo., through its receiver, Rolla Wells, who recently sought permission to spend $2,000,000 for the purchase of 160 cars, as noted in the April 10 issue of the ELECTRIC RAILWAY JOURNAL, has been recently authorized by the United States District Court, according to reports, to purchase 120 cars. This order will include sixty motor cars, fifty trailers and ten one-man cars. The new car, according to Albert T. Perkins, general manager of the United Railways, is of the pay-as-you-enter type and will seat fifty-nine people, but has standing room for seventy-one additional. The old type of car has seats for fifty-seven people and has room for sixty-eight strap-hangers. The new car has been in operation principally on the Grand Avenue line for several months and has indicated a saving of 31 per cent in power, when compared with the present type. Because of the lightness, rapidity with which it can be loaded and unloaded and its greater carrying capacity, the new type of car is said to be much more economical than the old ones. The entrance is at the front and the exit at the center.

Coal Production Improving

Car Shortage Prevents Large Increase Being Made—Effect of Railroad Strike Serious

Production of soft coal continued to recover slowly during the week ended May 1, but was still 16 per cent below the average during the first quarter of the year. The total output is estimated at 8,898,000 net tons. This was an increase of 413,000 tons over the preceding week, but was 2,117,000 tons less than that of the last week in March. The cause of this continued depression was the railroad workers' strike, which delayed movements at the most important rail gateways and junction points from St. Louis and Chicago to Buffalo and New York.

Incomplete returns from the principal carriers indicate that a further gradual improvement continues, but



DAILY PRODUCTION OF COAL BY WEEKS FROM JANUAR Y, 1917, TO DATE

that loadings are still much below normal.

The persistence of the railroad strike has widened the difference between the cumulative production of the present year and the record of the war years 1917 and 1918, according to Geological Survey figures.

Car shortage has been very acute, much congestion resulting from the switchmen's strike, which has had the double effect of blocking trains loaded with coal and of delaying empties returning to the mines.

Production first 104 working days	Tons
1917	181,980,000
1918	183,972,000
1919	141,541,000
1920	175,114,000

The year 1920, although 33,500,000 tons ahead of 1919, is nearly 7,000,000 tons behind 1917, and about 9,000,000 behind 1918.

100 Steel Subway Cars for Brooklyn

Cars and Equipment Costing $3,500,000 for New York Municipal Railway

Contracts for 100 steel subway cars to be built by the Pressed Steel Car Company for the New York Municipal Railway have been signed. The purchase of the cars is subject to the approval of the Public Service Commission. The cars will be similar to the ones now in use and will seat from eighty to ninety passengers.

Specifications on the cars are not complete as yet as there are some details still to be worked out. However, air brakes, control and motors have been decided upon. The Westinghouse Traction Brake Company will furnish the air brakes, which are of the A. M. U. E. type. The control is type A. B. F., to be equipped by the Westinghouse Electric & Manufacturing Company. The motors, 200 of which are required, have been placed with the General Electric Company. They will be type G. E. 248-A, which are inside hung.

The cost of the cars has not been given out officially, although the company executives estimate that each car complete will cost approximately $35,000. Delivery on the cars and equipment may possibly be made during the latter part of 1920. An option to purchase 100 additional cars is included in the contract with the car builder and with other manufacturers.

Steel Rails Sold by Army

62,490 Tons, Both A.R.A. and A.S.C.E., Bring $46 Per Ton

Offerings of steel rails to the amount of 62,490 tons, sealed bids for which were asked last month by the War Department, have been sold for $46 a ton. A large percentage of the rails is of the 80-lb. A. R. A. type, although small quantities of 70-lb., 60-lb. and 40-lb. A. S. C. E. rails in standard lengths without accessories were offered.

Hyman-Michaels Company, Chicago, Ill., was the largest purchaser. It bought 47,367 tons of the 80-lb. rails at $46.05 per ton, 3,199 kegs of track bolts at $3.90 per 100 lb., 126,812 pairs of splice bars at $2.15 per 100 lb., 15,603 kegs of track spikes at $3 per 100 lb., 200 switch stands at $10 each and 200 turnouts at $75 each, the total amounting to about $2,500,000.

Other companies which purchased rails and accessories in varying amounts were Lawler Brothers, Inc.; Bethlehem Steel Corporation, P. R. Phillips & Sons Company, the Godwin Construction Company, Richardson & Company, Aluminum Company of America, Track Specialties Company and a number of railroads.

Rolling Stock

York (Pa.) Railway is reported to be in the market for some new cars.

Quincy Railway Company, Quincy, Ill., lost fifteen summer cars in a fire which partially destroyed ten other cars. The loss is estimated at $25,000.

Illinois Central Railroad, Chicago Ill., has placed an order for fifty steel coaches which will later be equipped with motors and control for use on its suburban lines which are to be electrified.

El Paso (Tex.) Electric Company, noted in the Feb. 21 issue of the ELECTRIC RAILWAY JOURNAL as having placed an order for ten safety cars, has specified the following details on this equipment:

Builders	The J. G. Brill Co.
Type	Birney safety
Total capacity	70
Length over all	28 ft. ½ in.
Truck wheelbase	8 ft.
Rail to trolley base	12 ft. 6 in.
Width over all	8 ft.
Body	Semi-steel
Interior trim	Mahogany, light
Roof	Arch
Air brakes	Safety Car Devices Co.
Armature bearings	Ball
Axles, diameter	3⅜ in.
Car signal system	Faraday
Car trimmings	Bronze
Conduits and junction boxes,	National code
Control	K-63, double end
Compressor	West D H 16
Couplers, 1½ in. x 36 in. flat end for	1½ in. rim
Curtain fixtures,	Side windows and vestibule
Material	Fabrikoid or Pantasote
Designation signs	Hunter
Door operating mechanism,	Safety Car Service Co.
Fare boxes	Center platform
Wheelguards	Six bar, H B, lifeguard
Gears and pinions	Pressed steel
Governor hand brakes,	West S 6 A Norway iron
Heater equipment, not specified	
Headlight	Golden Glow, S. M-95
Motors	2-West, 506-AM-2
Paint	Varnish, light mahogany
Registers	Stone & Webster standard
Sanders	Air, furnished by builder
Sash fixtures, not specified	
Seats, Heywood Bros.,	57-SF steel mahogany
Seating material,	Rattan, 16 in. x 32 in. cushions
Slack adjuster, not specified	
Step treads	½ in. x 10 in.
Trolley catchers or retrievers	Ideal
Trolley base	1½ in. x 16 in. x 16 in.
Trolley wheels or shoes	
Trucks	Brill 29-E-1
Ventilators	Utility standard
Wheels	Southern Wheel Co., standard

Track and Roadway

Calgary (Alta.) Municipal Railway.—The Calgary Municipal Railway will install a manganese steel intersection at Center Street and Eighth Avenue, Alberta, to cost $34,000. A contract for the construction has been let to the Canadian Steel Foundries, Ltd., Montreal.

Los Angeles (Cal.) Railway.—The Los Angeles Railway is constructing a double-track line on South Park Avenue between Slauson Avenue and Merrill Street, to give adequate service to the Goodyear Tire & Rubber Company's plant. The company has secured permission from the Board of Public Utilities to proceed with the work, pending the formality of the Council granting a franchise.

Pacific Electric Railway, Los Angeles, Cal.—The Pacific Electric Railway plans to reconstruct its line in North Main Street, Santa Ana, at a cost of $100,000.

Union Street Railway, New Bedford, Mass.—The Union Street Railway proposes to extend its lines in Union and Arnold Streets, New Bedford.

Eastern Massachusetts Street Railway, Boston, Mass.—The Eastern Massachusetts Street Railway proposes to double-track its line in Boston Street, Lynn, and to lay a track in Federal Street, connecting with the Boston Street line. It also plans to extend its Franklin Street line, in Lynn, to lay a new track through Burns Street and to double-track its Lynn Woods line from Curtis Square to Conomo Avenue.

The Dallas Railway has filed with the City Commission of Dallas formal acceptance of the substitution of the Dallas-Wichita Falls interurban line for two of the interurban lines, each to be thirty miles in length, which the Dallas Railway Company agreed to build under terms of its franchise granted in 1917. It is expected that construction work will be started by July 1 next.

Twin City Rapid Transit Company, Minneapolis, Minn.—The Twin City Rapid Transit Company has begun work on its new loop line in the downtown section of Minneapolis and on lines to the east and west sides of the city. The company also has under construction a line in Seventh Street, Minneapolis, a new thoroughfare.

Central Texas Electric Railway, Waco, Tex.—The Central Texas Electric Railway, which proposes to build an interurban line between Waco and Temple, Tex., has begun the construction of the first unit of the line, from Waco to Robinson, a distance of 6½ miles. It is planned to have this unit in operation within sixty days. C. A. Ryfle is president of the company.

Trade Notes

Hess-Bright Manufacturing Company, Philadelphia, Pa., is planning to erect three one-story additions to its plant.

Canadian Westinghouse Company, Hamilton, Ont., Canada, is planning an addition to its local plant, to cost about $25,000.

W. N. Matthews & Brother, Inc., St. Louis, Mo., announces that the Chicago office is now at 29 South Desplaines Street, with Walter E. Bischoff in charge.

Independent Pneumatic Tool Company, Detroit, Mich., has moved from 736 David Whitney Building to 55 Garfield Building, where it has acquired larger quarters.

Jeffrey Manufacturing Company, Columbus, Ohio, manufacturer of coal-handling equipment, &c., has contracted for an extension 215x253 ft. to its property. The estimated cost is $160,000.

Power Specialty Company, 11 Broadway, New York, N. Y., manufacturer of coolers, heaters, superheaters, etc., is erecting a factory at St. Catharines, Ont., Canada. A foundry will be built later.

Automatic Straight Air Brake Company, 14 Wall Street, New York, N. Y., is operating a testing plant at 183 Greenwich Street and has leased space at Twenty-fifth Street and Eleventh Avenue for a new plant.

Cutler-Hammer Manufacturing Company, Milwaukee, Wis., announces that L. Brandenburger of Salt Lake City, Utah., will hereafter handle the company's line for Utah, the western section of Wyoming and part of the state of Idaho.

Electric Controller & Manufacturing Company, Cleveland, Ohio, has appointed M. B. Goodman manager of the company's Boston office, which will be opened this week at 49 Federal Street. Mr. Goodman was formerly in the New York sales office of the company.

Wellman-Seaver-Morgan Company, Cleveland, Ohio, at a recent meeting of the board of directors, elected John A. Penton, president of the Penton Publishing Company, a director of the company to fill the vacancy on the board caused by the death of Samuel T. Wellman.

Black & Decker Manufacturing Company, Baltimore, Md., has established a branch at 318 North Broad Street, Philadelphia. W. C. Allen is in charge. Its Cleveland branch office has moved from 6523 Euclid Avenue to 6225 Carnegie Avenue, where larger quarters have been obtained.

Davis Bournonville, Jersey City, N. J., manufacturer of oxyacetylene welding and cutting apparatus, elected De Witt V. D. Reiley president of the company, succeeding Augustine Davis, who recently resigned. Charles B. Wortham was elected vice-president and William G. McCune secretary and treasurer. The directors of the company are De Witt V. D. Reiley, Charles B. Wortham, William G. McCune, Augustine Davis, H. Rountree and Daniel E. Evarts.

Carborundum Company, Niagara Falls, N. Y., has acquired a plant at Perth Amboy, N. J., which will be converted to the manufacture of carborundum and refractory cements. The plant was formerly operated by the Didier-March Company and was purchased from the Alien Property Custodian.

Lincoln Products Corporation, 320 Market Street, Newark, N. J., a company which will sell power transmission specialties, has been formed with T. P. Cunningham, formerly sales manager, transmission department, Hyatt Roller Bearings Company, Harrison, N. J., as president of the corporation.

John C. Dolph Company, 168 Emmet Street, Newark, N. J., has discontinued the selling arrangement heretofore in effect with the Dolph Manufacturing Corporation. In the future all orders and requests for information concerning the company's insulating varnishes and compounds should be sent to the above address.

Electrical & Engineering Development, Ltd., 82 Victoria Street, London, S. W., 1, England, advises that it has been formed specifically to develop export trade to Europe, for the acquisition of the American patent rights on European electrical inventions and for the sale or disposition of European patent rights on American inventions. It has appointed engineers and representatives in the principal industrial countries and has laboratories equipped for testing and developing inventions.

Paul Kircher, formerly resident manager of the eastern territory for the Massey Concrete Products Corporation, with headquarters in New York, has been made resident manager, with headquarters in Chicago, in charge of the sales of the reinforced concrete poles which this company manufactures by the centrifugal process. This change will not affect his relations to Canadian business, as he will continue his duty as resident manager of the Canadian Concrete Products Corporation, Ltd.

Holden & White, Inc., Chicago, Ill., announces that Walter E. Hinmon, vice-president of Holden & White, has tendered his resignation, to take effect May 15. Mr. Hinmon leaves his present duties to enter the real estate business, with headquarters in his home city, Detroit, and the severance of his connection with the electric railway supply field, with which he has been identified for such a long period, no doubt will be a surprise to his many friends whose best wishes will follow him.

R. D. Nuttall Company, Pittsburgh, Pa., has appointed L. H. Keim general sales manager of the company. Mr. Keim went with the company in 1911 as engineer in charge of erection work and the installation of equipment. One year later he was promoted to the position of assistant chief engineer, designing and developing heavy duty railway and steel mill gearing. His headquarters were in Chicago, Ill., from where he extended service to gear users of every class. From this work Mr. Keim was brought back to the main office at Pittsburgh, to take charge of his present duties.

New Advertising Literature

Bates Expanded Steel Truss Company, Chicago, Ill.: A 128-page 1921 edition of its steel-pole treatise.

American Car & Foundry Company, 165 Broadway, New York, N. Y.: A booklet describing the Berwick electric rivet heater.

Belden Manufacturing Company, Chicago, Ill.: Catalog No. 8, giving prices and other data on electrical wire, cordage, cable, insulating materials, winding machines and other products manufactured by the company.

Blaw Knox Company, Pittsburgh, Pa.: Issues of the April and May numbers of "Blaw Knox Life," a well illustrated sixteen-page booklet devoted to the business and social activities of employees of the Blaw Knox Company.

Cutler-Hammer Manufacturing Company, Milwaukee, Wis.: Booklet H, a four-page leaflet, describing and illustrating soldering irons, including the automatic rack, soldering fixture and current regulator for temperature control.

Page Steel & Wire Company, Monessen, Pa.: A thirty-two-page booklet, "American Ingot Iron Wire" for electrical and mechanical purposes made from the product of the American Rolling Mill Company, Middletown, Ohio. Contains convenient form data and tables on the properties of iron wire of interest to engineers, superintendents and purchasing agents.

Metal & Thermit Corporation, New York, N. Y.: A third and revised edition of its pamphlet Laboratory Experiments with the Thermit Process of Welding. The pamphlet illustrates and describes various experiments which are intended to show the speed of the reaction, the heat produced thereby and the effects obtained by the superheated liquid slag and the superheated liquid steel.

Westinghouse Electric International Company, East Pittsburgh, Pa.: A monthly magazine containing engineering, semi-technical, merchandising and popular articles, together with international electrical news. One of the features is the pictorial section, illustrating some of the great engineering feats of this county. The column "I Want to Know" is incorporated in order that technical and general questions may be asked and answered. The publication is for foreign distribution and commencing with the July issue portions of the magazine will be printed in Spanish and Portuguese.