

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Manufacturers Are Helping Establish "Good Will"

IN LAST week's issue and also in that of Feb. 7 we published short articles about the kind of publicity and public advertising that the Western Electric Company is doing and illustrated them with some of its posters or "advertising copy." We believe this kind of action is more important and has a greater significance than can be shown in the few descriptive remarks possible:

What we see in this is the recognition of a few of the facts and ideas which we tried to emphasize in our issue of July 10, the chief of which is that messages which are for the good of the electric railway are ultimately beneficial to all connected with that industry, and further that one's own self-interest, correctly analyzed, should lead him to a realization of his own dependence upon the success of the industry in which he lives and works. The Western Electric Company has no monopoly of the idea, but it is doing a wonderful piece of work along this line.

One important fact is that this sort of publicity is effective, if the surprisingly large number of commendatory letters received by the company is any indication. If this is so, is it not worth while for manufacturers and operators alike to study the methods and principles of this publicity with a view to extending their application?

Pushing Maintenance Work Through the Shop

WHAT a world of difference there is in the way in which maintenance and repair work is dispatched in different shops! In some it is quite evident that the shop force has the work well in hand, in others the work seems to be the master. The writer recently had occasion to visit many shops on properties that stretched across the continent. He noted illustrations of the above; in fact, his observations suggested the present line of thought.

In a recent editorial in this paper the suggestion was made that research work would be found profitable on the part of any electric railway company. Nowhere is this more true than in the shop. The term "research" has an academic, "high-brow" flavor, but really every master mechanic who is alive to the possibilities of his job is doing more or less investigation. But in most cases this activity is unsystematized and desultory. A little concentration of effort would make it much more effective. In some shops there are young fellows of ability who are not loaded up with executive work to whom could be delegated the task of studying the local procedure to determine whether improvements are not practicable. While the operating department of the railway is speeding up the running schedules of the cars, the equipment department might well put a little

effort on speeding up the shop schedules. All workers will put more "pep" into their efforts when the work is going with snap and system. And a small percentage of time saving on each operation will bring far-reaching results. Some one individual, however, must make it his special business to study the proposition as a whole. If the master mechanic has time to do it, he is, or ought to be, well qualified for the task. But some competent person should do it.

Manufacturers frequently call in outside specialists, sometimes termed "efficiency experts," to show them wherein their factories are wasting labor and materials through lost motion. Competent advice in such cases is a paying investment. But in the railway shop there is usually enough talent already available to accomplish the same purpose. Is any one doing this work on your property? If so we should like, for the benefit of the industry, to know what results he has accomplished.

What About Substitute Ties?

ALL careful observers have noted that the price of timber has been advancing rapidly and the experts of the Department of Agriculture have declared that more timber is being cut than is replanted. Labor is high and freight rates are to be higher yet. Most of the tie timber used by electric railways comes to them by freight, because the local supplies have either been exhausted or else they are absorbed by the steam railroads. In 1916 one could buy a first-class sawn-heart pine tie laid down in New York for about 80 cents. Today the price is about \$2.50, and the quality of the timber is doubtful while the certainty of delivery is a mooted question.

With such conditions in mind, the position of the engineer who has used wooden ties in track construction to his entire satisfaction becomes uncertain, and the mounting cost must lead him to serious consideration of substitutes for his timber. As to substitutes, there are several types of steel ties which have had more or less vogue, and in the steam road field there are a number of different types of reinforced concrete ties as well as some steel ties under experimental observation.

Heretofore one of the reasons for continued use of wood ties by electric railways has been their cheapness, as compared to steel or concrete ties. But the price disparity between steel and wood has now practically disappeared, although concrete has increased in cost owing to scarcity of cement and lack of shipping facilities for stone. With steel and wood more nearly upon a price parity the use of steel ties is very likely to increase.

As to the substitute ties themselves, there are opportunities for further development and adaptation to the needs of the track. Most of these ties are designed to serve first as a tie rod or gage holder, and the

concrete in which they are usually embedded is supposed to carry the loads. We say "supposed" advisedly, because it is one of the most difficult tasks if not impossible, to get and maintain a good bearing contact between the concrete and the rail base. With some forms of steel tie the fastening devices are far from perfect and there has been a tendency in many cases to space ties too far apart in order to reduce the first cost. The reports of the board of supervising engineers, Chicago Traction, indicate the need for a spacing much closer than that of 4-ft. centers, which has prevailed. Experience elsewhere simply adds emphasis to the results of the Chicago study.

It seems to be clear that way engineers must begin to give thought to the subject of substitute-tie design, partly because the tie-timber shortage must be faced and partly because most ties now used as substitutes have been designed and promoted by manufacturing interests which may or may not have given sufficient thought to their design as engineering structures. The subject is one calling for a great deal of study. The results from existing installations, which have been sufficiently long in service, should be collected and compared.

The relation of the tie, of whatever type, to the track as a whole needs to be considered in the light of the information made available through the report of the committee on stresses in track of the American Railway Engineering Association. Tests along lines similar to those conducted by that committee and covering electric railway track conditions would furnish interesting data. It is to be hoped that the American Electric Railway Engineering Association may soon find time to give the subject of substitute ties the attention which its increasing importance seems to warrant.

Court Decision Improves Iowa Situation

IOWA electric railways in the absence of a state utilities commission have had a hard row to hoe. Things looked more gloomy than ever when in the Ottumwa case, in July, 1919, the State Supreme Court upheld the appealed decision of the Circuit Court that the contract provision as to rate of fare was legal and binding, but it left one ray of hope by stating that it would submit to a rehearing of the case. The Ottumwa company promptly petitioned for such rehearing and on Aug. 10, 1920, the court reversed its previous view and declared that portion of the franchise calling for a 5-cent fare to be invalid for the reason that the law does not give cities the power and authority to contract with street railways for a specified rate of fare.

Undoubtedly this favorable decision will be of far-reaching effect in all present and future fare controversies in Iowa, final determination of several cases having already been delayed pending the outcome of this Ottumwa case. We are glad to note this decision, for, like the companies of every other state, those of Iowa were not endowed with the foresight to realize that a fixed-fare franchise of immense present value might some day become a serious liability. And since this inequity of a fixed fare in a long-term contract has been established in most other states, it would have been unfortunate indeed for the railways of Iowa, almost alone, to be left longer in the predicament which the original Supreme Court decision caused. Perhaps the

effect of this decision may even reach Florida, where, for example in Jacksonville, the only recourse from the referendum of the people disapproving an increase in fare is to appeal to the courts for similar adjudication of the fixed-fare clause of the franchise.

Is It Amortization at Last?

BY RECENT decision of the Illinois Public Utility Commission the Chicago surface traction system inaugurated July 1 a plan for using the current renewal fund accruals differing somewhat from the stipulation of the ordinance requiring 8 per cent of the gross receipts to be deposited monthly in the renewal and depreciation fund, bearing 3 per cent interest. This decision was reviewed on page 337 of this paper dated Aug. 14.

This decision seems to mark an important step in the actuarial treatment of this very involved subject, and it is to be noted particularly that it will likely inaugurate the beginning of amortization in the case of the Chicago surface lines out of direct revenue, which has long been recognized as the chief omission of the 1907 ordinance as viewed in the light of present accounting knowledge.

From the commission's findings it appears that a \$10,000,000 fund (already on deposit) is big enough to constitute a safe "nest egg," earning only 3 per cent in a 7 per cent or 8 per cent market; that new equipment purchased direct from the renewal reserves will not increase the official capital account computed according to the formula of the 1907 ordinance, unless and until paid back; that this accounting expedient is authorized as an emergency measure, in view of the present money stringency; that a preceding temporary order establishing the renewal reserve as 8 per cent on the gross receipts, computed on a 5-cent fare basis, has been changed to 8 per cent of the total present receipts, in recognition of prevailing and continuing high cost of renewal material, and that the rate of expenditures for new equipment is automatically limited by the amount of unexpended balance remaining from the 8 per cent after normal renewals have been taken care of.

The accounting problem involved will be recognized as a simple expedient for anticipating the normal renewals of rolling stock, in order to avoid the necessity of buying new capital at excessive rates, and this seems to be eminently justifiable. Furthermore, it permits the property to turn over its current resources promptly, without banking or underwriting fee, by employing a liquid fund. To continue the present practice of placing all renewal reserve in the renewal and depreciation fund would be simply to increase by gradual steps a fund earning only 3 per cent interest. In other words, the whole process resolves itself into the familiar plan of "putting money back into the property."

As the "special equipment fund" authorized is directly under the eye of the commission and as it is the intent to expend the entire allotment on either normal renewals or equipment, there can be no criticism of abstracting part of the renewal and depreciation fund in contravention of the specific mandate of the contract ordinance, for there will be no balance left. Thus so long as the commission retains specific jurisdiction the situation is in safe hands.

Amortization has in late years been recognized as a fundamental necessity in securing ultimate stability in

capital enterprises, subject to the unalterable law of decretion through wear, use and other causes. It was pre-eminently recognized by the courts in the Kansas City ordinance, and the precedent has been followed in other cases. It makes little difference how amortization is brought about. The Chicago Traction Subway Commission in its 1916 report definitely recommended the use of the \$25,000,000 traction fund for the building of initial subways, the same to be uncapitalized, thus definitely recognizing the amortization principle in a commendable way. It seems idle to discuss arguments against such a plan, as there seems to be no other feasible plan that will tend to bring about a parity between property and capital account at the time when a resettlement will become the great public issue as in Chicago, and also the only plan which will equalize in the least harmful way the respective responsibilities of investor, operator and patron.

If, therefore, the action of the commission has rightly been construed as embodying this forward-looking expedient it must be regarded as eminently sound and just.

What Is Power Factor?

THIS question has been asked thousands of times from engine room to president. It has been answered unsatisfactorily as many times. Those of our readers who noted our emphasis of the importance of this little factor in our editorial columns of July 24 will think us facetious when we add, "There ain't no such animal!" Such is the bald truth, however. It is a case like the story of the blind man and the elephant, "They are both right." Neither side has grasped the entire perspective of the problem that is at hand.

Committees of our electrical societies have wrestled with the definition of power factor, particularly for a polyphase circuit, for years. At the recent convention of the A. I. E. E. at White Sulphur Springs eight very able papers by some of our best engineers were presented, setting forth both the practical and theoretical viewpoints. Yet the committee was continued and the problem is as yet unsolved.

We can measure kilowatt-hours of energy very accurately and charges are made accordingly for the energy used. Why bother, then, about power factor? Simply because the lower the power factor the greater the investment required to produce that energy, the greater the losses in its generation and transmission and the less the available capacity of the plant for delivering that energy. Hence the greater the costs *per kilowatt-hour*. Thus it touches the pocketbook and we must all "sit up and take notice."

Fortunately for the balanced three-phase loads usually generated or contracted for by the electric railways there is little question regarding definition and standardization of power factor. The difficulty arises only when the currents and voltages in the different phases are unbalanced or out of phase by different angles. That these conditions are serious with the present usage of the term "power factor" is very clearly and practically pointed out by Phillip Torchio in his paper presented at the annual convention of the A. I. E. E. *i.e.*, with different unbalanced three-phase loads of power factors varying from 100 to 50 per cent a delivered load of 1,000 kw. may require capacity of equipment ranging from 1,000 kva. to 2,175 kva., and with single-phase loads the variation may extend from

1,740 to 3,000 kva. All of these loads would be paid for upon a basis ranging from 1,000 kw. at 100 per cent power factor to 2,000 kva. at 50 per cent power factor with the present definition of power factor in common use. In cases of single-phase contracts, combined three-phase and single-phase loads or those poly-phase loads which are unbalanced with respect to voltage, current or phase relations within one phase, the papers in question should be carefully studied and care exercised that the proper standards are determined. Evidently in such cases we must either change our definition of power factor or introduce an additional element into our rates involving a properly defined "unbalance factor."

Manufacturers of electrical equipment, central stations and consumers would be affected differently by the various definitions proposed. The situation was therefore very well stated by Prof. V. Karapetoff of Cornell University, who told the following parable at the convention:

In a certain country, at a certain stage of its development, the circle used to be the only curve known, and any objects that could not be made square or rectangular were made of circular cross-section. It came to pass, however, that in the course of industrial development the advantages of a flattened circle or ellipse were gradually realized.

At first the forms of the ellipse used departed but slightly from the circle, and every one was speaking about "the mean radius of the ellipse," without thinking of any exact definition of the term. By and by more oblong forms of the ellipse began to be used, and with them came ambiguities, controversies and even lawsuits, until it became necessary to appoint a joint committee for the definition of the "mean radius of the ellipse." The committee began its activities by holding a public hearing to consider the interests of those concerned. First came the representatives of makers of canned meats, who stated that the public preferred elliptical boxes of the same height and contents as the former round boxes. So these representatives wanted the mean radius of the ellipse defined as that of a circle of the same area. Next came the makers of labels to go around the sides of the same boxes. They complained that they could not figure out correctly the length of the paper strip for the new elliptical boxes and they wanted the mean radius of the ellipse defined as that of a circle of the same circumference and not of the same area. Finally came the representatives of elliptical pie makers, who wanted two separate definitions for the mean radius of the ellipse. According to them, for selling purposes the largest radius of an elliptical pie should be defined as its "equivalent mean arithmetical radius," irrespective of the other dimension. For purposes of taxation the shortest radius should be used and defined as the "equitable mean geometric radius."

The committee was in great difficulty to decide among these proposals, when a shabby looking, underpaid college professor appeared and bashfully ventured the opinion that the thing really needed was not a fictitious definition of a mean radius of the ellipse, but a careful study of the actual properties of the ellipse. Then, he continued, the area as well as the circumference of the ellipse could be expressed in terms of its dimensions, and each industry could be provided with the needed data. Besides, such an investigation would open the way to further progress in the arts.

Although this parable created considerable amusement, it served well to direct the attention of those present toward the rational and fundamentally sound viewpoint advocated by the professor. This unique method involves the tangent of the angle between active power and total kilovolt-amperes in place of the cosine of this angle, which has commonly been known as power factor. Since the quantities involved in this new factor are readily measured on meters, the new ratio should have careful study as a possible factor in rates involving unbalanced loads. It may be found in the discussion of the papers on power factor in forthcoming issues of the journal of the A. I. E. E.

Safety Car Operation

Educational and Practical Methods Which Have Been Developed by the Kansas City Railways, Together with Complete Operating Rules for Safety Cars, Ninety-five of Which Are Now Being Operated by This Company

BY
HENRY S. DAY AND J. M. DAPRON
Equipment Engineer Kansas City Railways Mechanical Expert Westinghouse Air Brake Company



THE INSTRUCTION ROOM IS A BUSY PLACE DURING LUNCH HOUR

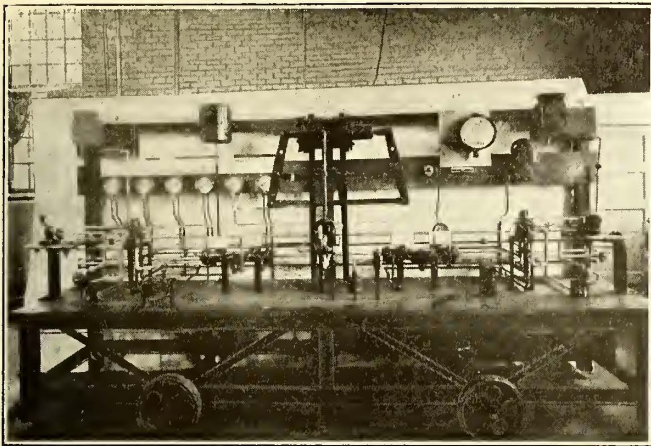
THE Kansas City Railways has had thirty safety cars in operation for a year, seventy for the last six months, and it is now operating ninety-five. All but thirty-four of these are operated from one carhouse, which now has a total of 210 cars, the balance being made up of double-truck cars weighing from 35,000 to 48,000 lb. each. All cars are inspected on a mileage basis, and operating costs are worked out on a ton-mile basis, the records for both inspection periods and costs being carefully checked. Recently certain changes were made in the records whereby maintenance costs of safety cars and other types are segregated, so that comparisons can be made. Operating conditions in Kansas City are very severe, due to many and steep grades, heavy passenger loads and fast schedules.

Safety car operation was begun on lines that looped through the heavy riding district, and so far this service has been maintained with few failures. It was, however, quickly discovered that successful operation depended largely on the efficient functioning of the air equipment of the cars, as while no great number of failures were experienced those that did occur were poorly handled by inspectors and repair men, while electrical failures were cleared up with little difficulty. It was apparent from the time that the first car was placed in the service that the personnel at the shops and carhouses was impressed with the idea that the equipment on the car was complicated and that this was particularly true of the air brakes and auxiliary air apparatus. As this company has not a single line on which there are not severe grades, one busy line having to negotiate 13.7 per cent, it was quickly realized that operators, inspectors and repair men must be taught

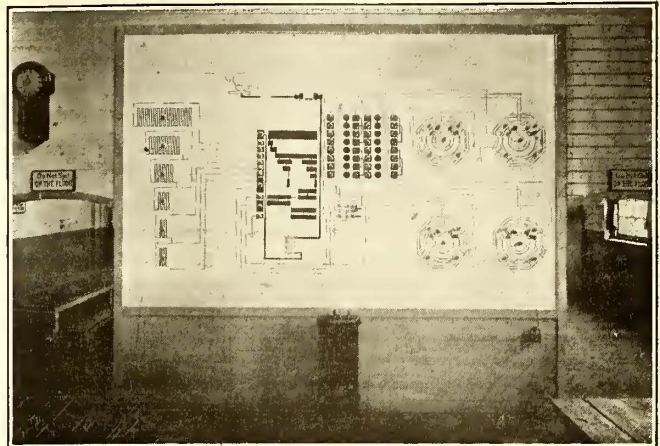
thoroughly to understand the handling and maintenance of the air brake equipment, and with this in mind a definite program was prepared whereby repair men could be taught in detail the functions of every piece of apparatus and when and how it should be inspected and tested. The inspection of the safety car was, of course, taken care of from the outset by the same system as applied to other cars, but experience has shown that the car can, if anything, run on longer inspection periods, but that there is need of special instructions on the air devices.

TEST RACK VALUABLE

The first step taken toward carrying out this program was to build a test rack, comprising a single and double end safety car control equipment, with the addition of sand traps and such air-operating devices as are installed on the safety cars of this railway. The rack was designed in the form of a bench with posts in the back, extending about 4 ft. above the top. These posts were equipped with brake valves, controller handle, foot valves, door and step controllers, emergency valve, rear door unlatching device, register foot valves and register, mounted on brackets secured to the top of the bench and arranged in such a manner that the valves can be taken apart without disturbing the pipe connections. On the three posts at the back of the bench the respective pipe lines are run in a horizontal position. The brake cylinder, compressor switch, fuse, governor, sand reservoir, circuit breakers, register and gages are installed on the extended posts above the bench. The main reservoir and compressors are hung to the underside of the bench top; all pipes are provided with gages



DOUBLE-END SAFETY CAR AIR BRAKE TEST RACK



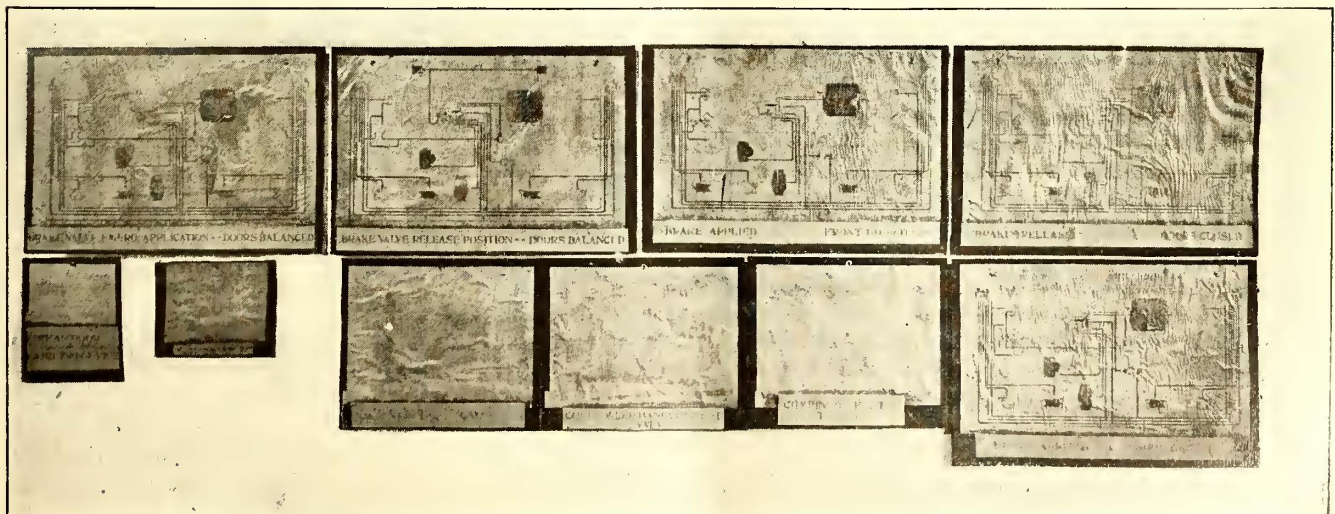
INSTRUCTION CHART FOR "K" CONTROL. COLORED LAMPS SHOW PATH OF CURRENT

and cutout cocks arranged in a manner which provides for the testing of each device. Each pipe line is represented and identified by a color, while the gage connected thereto is provided with a target of the same color with the name of the pipe and volume represented. When it becomes necessary to represent a single end equipment for demonstration the necessary cutout cocks are closed. The rack has also been mounted on wheel carriers which provide for quick and easy removal from one department to another and when not being used in the air brake department for testing the rack can be moved to the instruction room without disturbing any of the pipe connections or equipment. As will be seen from the foregoing, the rack is of unusual design and differs from the ordinary test rack found in most railway shops. It will be noted by referring to the accompanying illustrations that great care was exercised in the arrangement of each piece of apparatus and that by raising the various devices well above the bed of the bench all pipe lines and pipe connections to the base of valves are clearly exposed and easy to trace. The only equipment placed underneath the bench consists of the main reservoir and air compressor connections. The system of pipe connection, mentioned below, was made more easily understood by a color scheme which was used purely for educational purposes in connection with diagrammatic charts. Sets of five diagrammatic charts were secured from the Safety Car Device & Equipment

Company, illustrating the apparatus and position of the respective valves for the various conditions as follows: (1) Release position—doors closed; (2) application position—doors closed; (3) application position—front door open; (4) brake valve emergency—doors balanced; (5) controller handle emergency—brake valve in release position, doors balanced.

COLORED CHARTS AID INSTRUCTION

A set of these charts were colored so that each pipe line with valve, ports, etc., corresponded in color with that on the test rack showing the five applications which are made in the operation of safety car control equipment. In the demonstration an application was made on the rack and the operation was illustrated by referring to the chart corresponding to the application made. For example, if the brake valve handle on the rack was placed in application position with the controller handle down, the chart corresponding to this position was used and its colored lines showed that the communicating ports in the brake valves provided air pressure through ports in the rotary, straight air pipe, cavity in the emergency valve, slide valve and into the brake cylinder. This same color showed the straight air pipe pressure with its communication to the combined foot and cutoff valves and that the emergency pipe was being charged while in this position through a feed port in the emergency valve and that the emergency



COLORED CHARTS ARE USED IN CONNECTION WITH TEST RACK

line furnished air pressure to the closing side of the door and step controllers. Pipes and valves with air pressure are colored, while pipes not in use in the application under discussion are shown without color.

MEN COLOR THEIR OWN CHARTS

With a view of awakening interest among the men and as an incentive to study the equipment, repair men and inspectors whose duties required attention to safety cars were supplied with a set of charts, not colored, and were instructed to color them as they became familiar with the system. Master charts hung in the instruction room were always available, and these men were requested to bring their charts to the school of instruction which has been started and is held once a week. At this school the test rack and charts are used and questions answered in the usual manner following similar instructions. The response among the men has been very gratifying, and it is believed that in a short time there will be the necessary number of employees thoroughly instructed and competent to handle this equipment properly.

Thus far no very radical changes have been made in the system on inspection except that a definite leakage test has been put into effect. This test consists of charging up to 63 lb., holding controller handle down with brake valve handle in full release position and compressor switch open. When the gage shows that the air pressure has leaked down to 60 lb. time is taken, and

again at 55 lb. and 50 lb. This gives the average rate of leakage per minute. The same method of determining the rate of leakage is employed by next moving the brake valve handle to application position and then releasing the controller handle. After this reading has been secured the brake valve handle is moved to the door-opening position and another reading is taken. The first test will include the main reservoir and accessories, main reservoir pipe, emergency pipe, door-closing side of the door and step controllers and the rear door unlatching device. The second test includes the above-mentioned fixtures with the addition of the straight air pipe and brake cylinder. The third test includes all of the second test with the exception that the door-opening side of the door and step controller is charged. When the average rate of leakage is 2 lb. per minute or over the equipment is gone over with soapsuds and the leaks are repaired until $1\frac{1}{2}$ lb. per minute as a maximum rate of leakage is secured.

During the past winter considerable trouble was experienced from freezing of air equipment. To overcome this trouble the 1 in. pipe between compressor and main reservoir was replaced by a 2 in. pipe. On these cars no further trouble from freezing was experienced.

It may be interesting to other roads operating or contemplating the operation of safety cars to include the operating instructions prepared by the mechanical department of this property and approved and used by the transportation department.

Instructions for the Operation of Safety Cars by the Kansas City Railways

General: In handling the safety car it must be kept in mind at all times that the car is distinctly a different type from the ordinary trolley car; that it has certain limitations, and that these limitations must be favored by the operator. The total weight of the car, without passenger load, is about 15,000 lb. With an unloaded car or a small load there is always a possibility of the wheels sliding and a consequent flattening, unless the operator follows instructions under "Brakes."

A "full" load for a safety car is sixty passengers and this number should not be exceeded. When this number of passengers is reached, the "Car Full" sign should be displayed and no more passengers allowed to board the car. Due to the light construction of the car body and the horsepower of the motors, no attempt should be made to push or pull a car, other than a safety car. One safety car can handle one other disabled safety car, but *no more*. In case the car ahead is of a heavy type and disabled the disabled car will have to be removed by some other means.

Where it is found necessary for the operator to get onto the roof of the car he should never touch the trolley pole when it is against the trolley wire unless he is standing on the running board. Due to the construction of the car it is not possible to completely insulate the roof, and there is always a possibility of receiving a shock sufficiently heavy to cause the operator to let go his hold and perhaps fall from the car. In other words, it is possible to receive a shock if the roof and the

trolley pole are touched at the same time by any part of the body. Also the roof is of light construction and not made to support the weight of a man off the running board.

Motors: The safety car is equipped with two motors, which are connected practically the same as the motors on the ordinary two-motor single-truck car. Owing to the horsepower of the motors and the light car body, it is possible to start a car rapidly and to feed up the controller much more rapidly than on the ordinary car without knocking out the circuit breaker or causing harm to the electrical equipment. It is of the greatest importance that the notching up of the controller be done smoothly and without jerking. With heavy loads and on grades the operator must use discretion, and the amount of time required on each resistance point is of course governed by the passenger load.

A safety car, like any other two-motor car, can be stopped by reversing, but the effect on the car and motors is much more severe, and a safety car *must never be reversed* except when the brakes are absolutely inoperative, and this rarely happens. It is a demonstrated fact that a car moving at a rate of 5 miles per hour or more can be stopped by a brake application in a less distance than it can by reversing.

RULES FOR OPERATING THE AIR BRAKE AND SAFETY CAR CONTROL EQUIPMENT

The following rules are intended to cover, in a condensed form, the import-

ant instructions to be observed in handling this equipment in service.

Charging: Before starting the air compressor the main reservoir drain cocks should be closed and the cocks in the door-closing pipes opened. All hand brakes should be fully released. The fuse in the compressor circuit must be in place and "alive." The handle on the brake valve should be moved to release running and door-closing positions and the compressor started by closing the snap switch in the compressor circuit. The controller handle in the handle base portion should be held down until the gage hand indicates at least 50 lb. pressure in main reservoirs, and under no circumstances should a car be started with less air pressure in these reservoirs.

Running: The brake valve handle should be kept in release, running and door closing position when not being used for a brake application. The controller handle or foot valve should be held down while the car is running, and in the event of sudden danger the hand or foot should be removed immediately from the respective valves, or the brake valve handle moved quickly to emergency position, at the extreme right, and kept there until the car stops and the danger is past. If the brakes apply while running, due to rupture of the piping, the brake valve handle should be moved to the emergency position at once, to prevent loss of main reservoir pressure. After the car stops the cause of the application should be located and remedied before proceeding.

Service Application: To apply the brakes for an ordinary stop the brake valve handle should be moved to service application position. When the desired brake cylinder pressure, depending on speed, condition of rail, grade and kind of stop desired, has been obtained the brake valve handle should be returned to lap position, where it should remain until it is desired either to release the brakes or to make a heavier application. In the latter case the handle is moved again to service application position, thus further applying the brakes until the desired result is obtained and then returned to the straight air lap position.

The controller handle or combined foot and cutoff valve must be held down until the stop is completed and the brake valve handle moved to service application position or door opening position. While a car is standing the brake valve handle must remain in service application position or door opening position, at which time the pressure on the controller handle or combined foot and cutoff valves, as the case may be, can be released, thus permitting the car operator to attend to any duties incident to the stop. The best possible stop will be made when the brakes are applied hard at the very start and then graduated off as the speed of the car is reduced, so that at the end of the stop little pressure will remain in the brake cylinder, unless on a grade. Since the retarding effect of any given application of the brakes is considerably greater at low than at high speed, a heavy application at low speed will result in an abrupt stop, with perhaps discomfort to the passengers or slid wheels. At high speeds a heavy initial application should be made, in order to obtain the most effective retardation possible when the momentum of the car is greatest. If the brake cylinder pressure is very light at first, and is increased as the speed of the car diminishes, it not only makes a longer stop, but the high cylinder pressure at the end will be liable to produce a rough stop, perhaps slide the wheels and result in loss of time, because of the necessity of waiting until this high cylinder pressure can exhaust before proceeding. With practice these correct methods of stopping can be readily acquired.

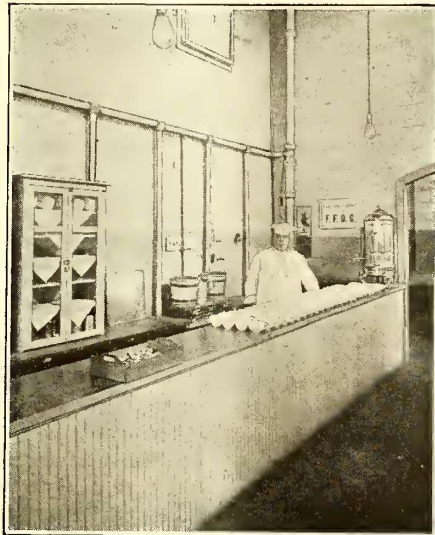
Holding Brakes Applied: When the desired brake cylinder pressure has been obtained the brake valve handle should be placed in straight air lap position, where it should remain until it is desired either to make a heavier application or to release the brakes. The brake valve handle should never remain in straight air lap position, except while bringing the car to a stop, and in any case it should not be allowed to remain in this position for a sufficient length of time to permit the brake cylinder leakage to diminish the braking power materially.

Release: To fully release the brakes after any application the brake valve handle is moved to release, run-

ning and door closed position. The handle must be left in this position at all times when the brakes are not in use, to keep the brake system charged and ready for operation, and to insure that the brakes will not be applied by leakage. Immediately before moving the brake valve handle to release, running and door closed position, which action usually precedes a movement of the car, the controller handle must be held down.

To graduate or partially release the brakes the brake valve handle is moved to release, running and door closed position for a moment, then back to straight air lap position; this operation may be repeated as often as necessary until the car is brought to rest, with only sufficient pressure retained in the brake cylinders to prevent rolling. During this manipulation of the brake valve handle the controller handle or combined foot and cutoff valve must be held down.

Opening Doors and Steps: When the car stops the brake valve handle



THE COMPANY SUPPLIES THE EQUIPMENT, WHILE EMPLOYEES PAY FOR COFFEE AND SELL IT AT 2½ CENTS PER CUP

should be moved to door opening position for the purpose of opening the doors and lowering the steps on the operating end of the car. After the brake valve handle has been in this position for approximately one second the pressure on the controller handle and combined foot and cutoff valve can be released. While the door and steps remain open the car cannot be moved, as the brakes are fully applied.

Closing Door and Steps: All brake valve handle positions to the left of door opening position are, in addition, door closing positions. Should it be desired to close the doors and raise the steps without releasing the brakes, the handle must be returned to service position. Where it is desired to close the doors and steps and release the brakes at the same time, such as preliminary to a movement of the car, the brake valve handle is returned to re-

lease, running and door closing position on the extreme left. Immediately before this last operation of the brake valve handle the controller handle must be held down.

Emergency: Emergency situations may be found to exist either because of conditions outside the car, such as the movement of pedestrians and vehicles, or because of conditions originating within the car, such as inadvertence or inattention on the part of the car operator to his duties. With respect to the class of emergency situations first mentioned above it is assumed that the car operator is alert, in which case should it become imperative to stop in the shortest possible time and distance; to save life or avoid accident, the brake valve handle must be moved quickly, from whatever position it may be in, to emergency position, which is at the extreme right, and left there until the car has stopped and the danger is past. While the brake valve handle is in emergency position it is not necessary to hold down the controller handle or the combined foot and cutoff valve. This movement of the brake valve handle, in addition to providing maximum brake cylinder pressure, provides a supply of air through the emergency valve, for the purpose of sanding rails. Also, by exhausting emergency pipe pressure, air pressure is released from the closing side of the door and step controller, so that the doors and steps on both ends of the car can be easily moved by hand. It is intended that the rear door and step be used as an emergency exit.

Concerning the second class of emergency situations, it should be remembered that the operator is required to either hold the controller handle down by hand or press the combined foot and cutoff valve downward at all times with the car in motion; that is, without the brake applied to such an extent that the application would in itself stop the car. Should the operator, for any reason, unintentionally or otherwise, release the controller handle and combined foot and cutoff valve while the brakes are not applied, as before mentioned, this may properly be termed an emergency situation which calls for emergency action, and the result will be the same as described under "Emergency" as initiated from the brake valve, with the additional feature of opening the motor circuit by actuating the circuit-breaker cylinder.

Release After Emergency: To release the brakes and restore normal conditions after emergency action the brake valve handle is placed in release, running and door closed position and the controller handle held down until 50 lb. pressure is reached in the main reservoir, as indicated by the gage.

Changing Ends: Preliminary to changing ends, the brakes must be fully applied, when the brake valve handle and the controller handle can be removed. This brake application is required to prevent emergency, which would otherwise occur upon removal of the controller handle, and it insures

that the car will stand still during the time required to change ends. If the handles are not replaced in their proper positions within a reasonable time to guard against excessive brake cylinder leakage, emergency action will automatically occur. Upon reaching the end of the car from which it is intended to operate, the brake valve handle should be placed in service application or door open position, as may be required. Before attempting to move the brake valve handle to release, running and door closing position the controller handle must be in place and held down.

Sanding: A feature of great importance in obtaining the most effective operation of any brake is that of properly sanding the track when making the stop, since the maximum retarding force is developed when the adhesion between the wheels and the rail is the highest possible. Whether this be realized or not necessarily depends very largely upon the condition of the rail. Various independent sanding devices have heretofore been used for sanding, but in these cars, by incorporating the sanding device in the brake valve, sand may be applied to the rails with the minimum amount of effort on the part of the motorman and with greater safety and efficiency.

The brake valve is provided with a hinged handle, the downward movement of which operates a poppet valve, through the medium of a bail, and air may thus be admitted from the main reservoir pipe to the sand box for sand-

ing the rail for service operations. This manipulation is possible in any position of the brake valve and without requiring the operator to remove his hand from the handle. To insure that sand will be applied to the rails in all emergency applications of the brake, no matter how initiated, air is admitted from a sanding reservoir (normally kept charged from the main reservoir) to the sand pipe through the medium of the emergency valve when it is placed in emergency position.

Whenever it is desired to sand the rails in making a stop this should be done, if practicable, before the brakes are applied, for the reason that if the brakes are set and the wheels begin to slide the application of sand will not, in all probability, cause them to revolve again, and flat spots may result.

In such event, the best practice is to release the brakes slightly at the moment of applying the sand, after which a much higher brake cylinder pressure can be used without causing wheel sliding. If sand is used the rails should be well and continuously sanded until the stop is made or the brakes released.

Circuit Breakers: On such occasions as the circuit-breaker cylinders are called into action, thereby cutting off the current to the motors, it is necessary to turn the controller handle to power-off position before cutting in the power again through the circuit breakers.

Correct Brake Operation: To gain time in the use of power for propelling the car the brake application should be adapted to the speed of the car—for example: At a high rate of speed a full brake cylinder application should be made and graduated off by partial release as the car is coming to a stop. This is accomplished by moving the brake valve handle from service to lap position and then quickly to release position and back to lap. During the stop the point at which these graduations should be begun and the amount of the graduations will be readily acquired through experience. The initial application should be heavy enough and made at such a distance from the stopping point that the car will stop before reaching the stopping point, unless the graduations are made. When the actual stop is made there should be just sufficient brake cylinder pressure to insure that the car will remain in a standing position.

It should be remembered that in making these graduated releases, if a mistake in judgment has been made and the car is not likely to stop until it is past the stopping point, the cylinder pressure should be increased by making a reapplication. With a small amount of practice the required degree of skill in making correct stops can be very readily obtained. The condition of the rail is to be considered at all times when making brake applications, so as to avoid wheel sliding, which greatly lengthens stops and may cause flat spots.

Hogging the Load

AN INTERURBAN railroad in the middle West had considerable trouble with a few of its cars, in that some of the motor's armatures had to be changed quite frequently on account of insulation failures resulting in a breakdown to ground. When this occurred a new or repaired armature would be put in the frame and the car replaced in service, with the result that after making a comparatively low mileage the car was again turned in for trouble, which was found to be the motor with the replaced armature. In repairing these defective armatures it was observed that in all cases the insulation on windings was badly roasted, indicating overheating. As there was nothing found wrong with the method of winding and connecting these armatures and as the fact was that several different armatures had failed in the same field it was suggested to check carefully the winding of the field.

A temporary circuit was arranged in the repair barn and current passed through the field coils connected in series. By checking the polarity of the coils with a small compass needle it was discovered that one of the fieldcoils was reversed. This was remedied and a new armature placed in the frame. After this had been done no further trouble developed. The other cars afflicted with the same ailment were given similar treatment, which cured the trouble.

The following explanation is given as the source of this equipment ailment. Several months prior to this trouble, on account of snow and water conditions, a number of main field coils had failed and were replaced

by new ones. On account of the markings on the coil terminals not being clearly understood by the workmen these coils were wrongly placed on the poles. Under these conditions the windings on this motor produced a weaker magnetic field, resulting in its armature running at a higher speed. When this motor was put on the car it tended to "hog the load," resulting in an increased current that overheated the windings, roasted the insulation and finally caused it to break down and cause a ground or short.

Troubles with reversed polarity of fields and wrong connection of field coils with additional methods of testing and locating such troubles were described in the *ELECTRIC RAILWAY JOURNAL* issues of May 17, 1919, and June 21, 1919. Some shops have reported difficulty in locating reversed polarity by a compass, as the polarity of the compass needle itself is easily reversed if care is not used to keep the magnetizing current used through the fields as small as possible. The other methods referred to use special shop made equipment which is easily constructed.

F. W. Mitchell, supervisor of safety and examination of the New York, New Haven & Hartford Railroad, reports through the *National Safety News* a reduction of 48 per cent in number of employees killed during 1919 as compared with the previous year, with a reduction of 16 per cent in number injured. There has been a heavy reduction in number of accidents since the safety department was organized.

Bonding in Special Locations

Cross Bonding and Special Connections to Structures, Bridges and Poles Constitute a Class of Bonding Universally Used and One Requiring Care in Installation

By G. H. McKELWAY

Engineer of Distribution Brooklyn Rapid Transit Company

WHILE in most cases the bonding of the joints between the abutting ends of rails comprises by far the greatest amount of work that the bonders of a railway company are called upon to do, yet there are several other kinds of bonds to be applied on practically all roads, except the very smallest.

These bonds are for cross bonding between the rails of the track or between tracks and supplementary copper-returns run in multiple with the track rails, for bonding cross pieces of special trackwork, special connections between the track rails in carhouses, shops or yards, the connection of track rails to elevated structures or bridges, the crossing of streams and the attachment of ground wires leading from the negative buses of power or sub-stations to the tracks or other ground returns in streets or rights-of-way.

The most common of these special forms of bonding is cross bonding the rails of the tracks together. There is no standard distance apart for such cross bonds and the answers to questions which were sent to more than forty railroads by the United States Bureau of Standards regarding such distances proved that the lengths of track between the cross bonds varied from 100 ft. to 3,000 ft., the usual distance being every 500 ft. As a matter of fact, on a single-track line cross bonds should not be needed if both rails of the track are well bonded and could be kept in that condition, and their use is merely the confession of the inability of the company to keep its bonding up to 100 per cent efficiency. With perfect bonding and only a single track the current naturally would divide equally between the two rails so that there would be no need for cross bonds. Where there are two or more tracks, however, they would be needed, as it is unlikely that the loads on the various tracks would be equal and they must therefore be equalized through the cross bonds.

Not only is there no standard distance apart for the cross bonds to be installed but, when they are installed there is no standard size of wire used, although the most common size for cross-bonds as well as for rail bonds, is No. 0000. In most cases the cross bonds are merely bonds similar to those used at the joints, with the exception that the length of strand between the terminals is much longer, the additional length being required to reach across from one rail to the next. As with all other long bonds that are more or less exposed, there is always considerable danger of their being stolen, even where they are buried in the ground, unless the track is in paved streets where the bonds cannot be disturbed after they are installed. To prevent their theft, where they are installed in open track, they are sometimes run between the ties and covered with dirt, and in addition to that pieces of tin or short pieces of wood are nailed to the ties to enclose the wires. Such precautions are often of no value, as the tin or wood will be torn off or broken and then the wires stolen. A much surer way, and a more expensive one, is to encase the cross bonds in concrete, and where enough concrete

is used the job can be considered a permanent one. On one road where the standard cross bond for a four-track line had been a 500,000 circ.-mil wire, so much trouble was experienced from theft that the wires were all replaced with old rails connected to the track rails above with short bonds compressed into both the cross-bonding rail and each of the rails above it.

SUPPLEMENTARY WIRES NO LONGER COMMON

A practice much more common in the earlier days of street railway construction than now was to run supplementary copper, consisting of a wire or wires, in multiple with the rails. These supplementary wires were sometimes run on the arms of the trolley poles with the positive feeders, but more often were buried in the earth between or alongside the tracks.

When the negative wires are carried on the poles taps have to be run down to the rails every few hundred feet, and this not only requires additional wire to make these taps but there is danger of the portion running up the pole being stolen unless it is well protected by being encased in either pipe or molding of some kind. Merely fastening the wire to wooden poles with staples will not answer satisfactorily unless a great many are used in the portion that can be reached from the ground. It is generally sufficient to extend the pipe or molding only 7 or 8 ft. from the ground, but sometimes the thieves will be found willing to climb the pole in order to get the wire and they will even cut down sections of the wire that have been run on the poles.

When wire installed on the poles is stolen the thieves naturally prefer to take the negative wire on account of there being less danger to themselves and less chance of the theft being discovered as soon as would be the case if they removed the positive wire. The writer knows of one case where a mistake was made by some copper thieves who cut down a wire that had previously been used as a ground wire, but which a short time before had been cut over to the positive side. Believing that there was no danger they were careless in their handling of the wire and permitted it to ground on an iron gas lamp post. The resulting fireworks frightened them away, and although they were not caught there was no further attempt to steal copper in that neighborhood.

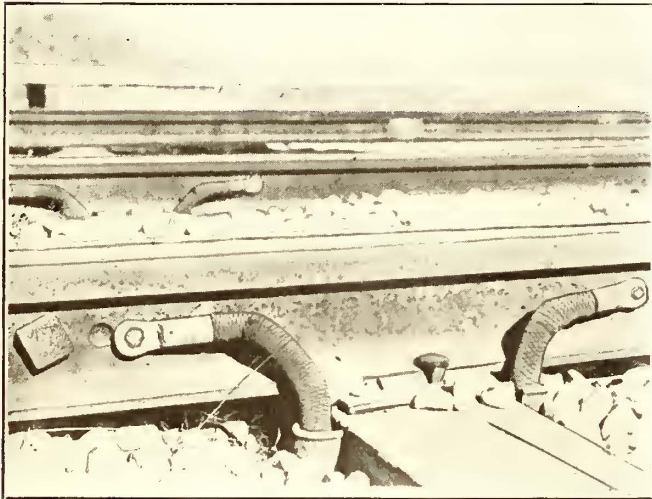
Where iron or steel trolley poles are used for carrying the feeders it is sometimes the custom to drill a hole in the pole near or below the ground line and bring the tap from the tracks up inside the pole, making another hole near the arm so that the wire can be run out and connected to the supplementary wire. Such holes, and especially those under or just at the ground line, weaken the poles and shorten their lives as they permit the entrance of moisture to a portion which cannot be protected by periodic painting.

Another objection to the use of overhead ground wires is that by having both positive and negative wires close to each other there is more danger to the men working

on them, as there is always the chance of their touching both wires at the same time and also, when there are several wires on the same pole, there is danger of making a mistake and trying to connect wires of opposite polarity.

So long as the pole line parallels the tracks there is but little if any reason why the supplementary wires should be carried overhead unless it is desired to use them as an insulated return. Of course wires buried in the ground are not so well insulated as those carried on poles, but if they are tapped frequently to the uninsulated rails there is no reason for attempting to insulate them. When the negative wires on the poles are part of an insulated return system these conditions do not apply and they cannot then be considered as supplementary wires.

Supplementary wires, except for comparatively short runs near the power or substations, are of very little value, as the current density in them must be kept low if



PIN-EXPANDED TERMINALS FOR HEAVY BOND WIRE

the return drop is to be held at a reasonable figure, and much better results can ordinarily be obtained by spending only a fraction of their cost in maintaining the bonding rather than in installing the additional copper. A pair of well-bonded track rails of only the ordinary weight will have a conductance equal to copper wires of at least 1,500,000 or 2,000,000 circ.mil cross-section, so it is easy to see that unless a great deal of copper is run and at great expense, but little reduction in the return drop can be expected.

It is not, however, considered good practice to rely merely upon rail bonding at points where there is special trackwork. In such places there is liable to be more movement of the track than where it is composed of long pieces of rail, and that movement is certain to cause the bonding to deteriorate rapidly.

Still another reason for abandoning the use of the ordinary type of bonds at each of the joints is that there are comparatively a large number of such joints in a short length of track, so that the cost both of bonding material and the labor to install the bonds would be high. Again, the special work will not last nearly as long as will the straight track, so that the former may be renewed several times before the latter is worn out. Then, if the special work has been bonded at the joints with short bonds, new bonds will have to be installed in the special work perhaps three or four times as often

as in the straight rail, and as there is very little salvage from the old bonds—in fact, unless close watch is kept on the laborers making the track changes there will be none, as the rail bonds will be kept by them and sold to junk dealers instead of being turned back into the store-room—the cost of bonding will each time be approximately the same as for the first installation.

BONDING OF SPECIAL TRACKWORK

A better way, and the one that is now standard on almost all of the large properties, is to “jump” the special work with long bonds made up from pieces of wire, these cables being attached to the ends of the pieces of straight rail and running to the straight rail on the other side of the special work. These cables can be considered as a permanent investment which ought never to require renewal, the only portions of such bonding that have to be changed, under usual conditions of soil, being bonds of small capacity running from the cables to a few points in the special work to which the bonds are connected so that there will be no large differences of potential between the various pieces of metal making up the track special work. As the heavy cable bonds will keep the potential of the ends of the straight rail on each side of the special work practically the same, all of the special work between those points will be of the same potential except when there is a car on the special work taking current from the positive side of the circuit. To prevent the resistance of the unbonded joints in the special work from causing a large difference of potential between the adjoining pieces when current is flowing from the car into the castings is the reason for bonding some of them to the wires and so insuring that there will be but little drop between any piece of the trackwork and the long pieces of rail in the straight track.

Not only will it be unnecessary to renew the bond wires when the special work is renewed but they can also remain in place even if the rails in the rest of the line are renewed. All that will have to be done will be to disconnect the terminals at the ends of the wire from the rails and then to reconnect them to the new rails when those are laid.

If for any reason the special work is abandoned and taken up the bond wires, too, can be removed and either sold as scrap or, if they are of the right length, used to bond another similar piece of special work somewhere else on the system.

In order that the wires can be removed or changed to conform to a new special work layout, in case the type of layout should be altered, it is best to run the wires over the ties rather than underneath them in all places where the track is installed with a concrete foundation over which paving is placed. For special work layouts in open track it is best to bury the wires and place them under the ties so as to prevent their being stolen, but where the wires are protected by the pavement that arrangement is neither necessary nor desirable, because if it is made when the special work is taken out it will be necessary to break out more of the concrete foundation and then dig down to get wires out. Another reason for keeping the wires above the ties is that in case of any excavation by other companies or contractors under the tracks the wires are not exposed to the employees of the contractor while hidden from those of the railroad company. When bonding is exposed to the sight of the ordinary contractor's laborer

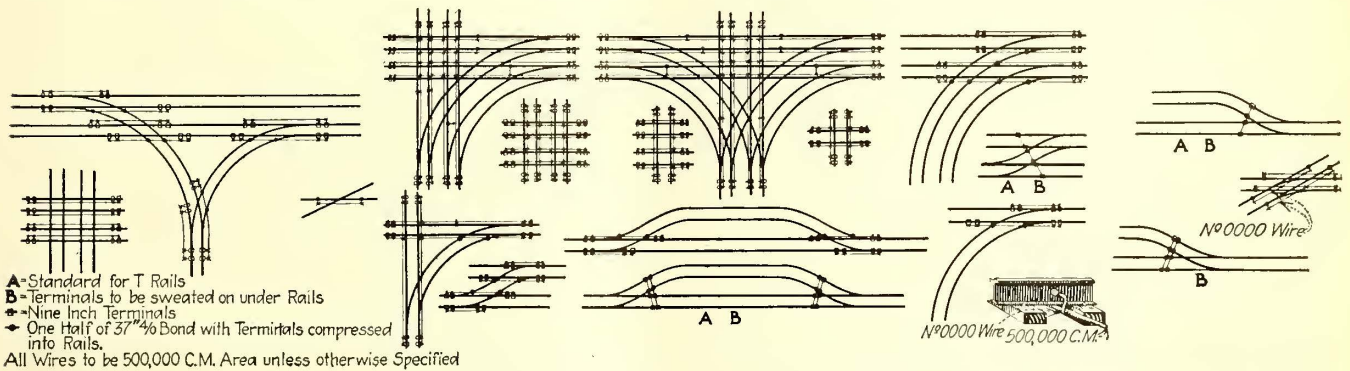
and to no one else, experience shows that the temptation to cut them off and dispose of them at some nearby junk shop is nearly always too strong to resist.

The wire used for such special work bonding may be made up of any wire on hand, insulated or uninsulated. Comparatively short lengths, too short to be advantageously used on pole lines, can be used up in this way instead of being sold as scrap.

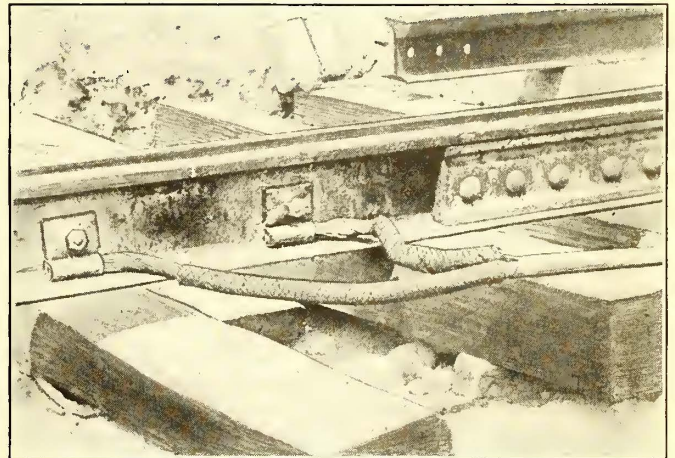
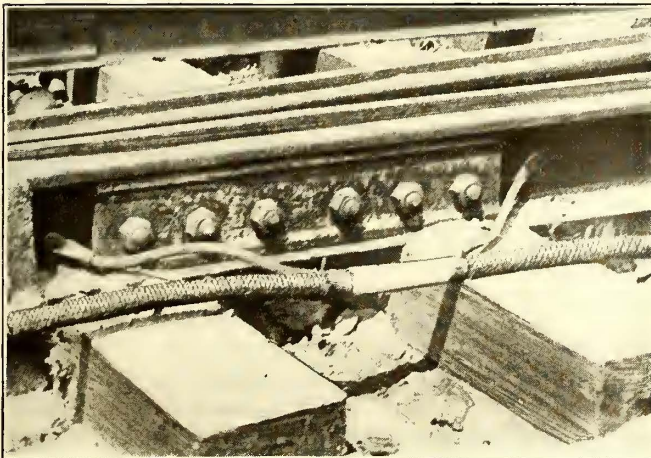
Often weatherproof wire is taken down from a pole line after having been in service for many years, and the insulation on it will be found to be in such poor condition as to preclude its use overhead unless it is first reinsulated. At the same time the conductor will be in as good condition as when new, so that for bonding purposes the wire is as good as any other. The rails to which the bonding wires are attached are unin-

can be used only on girder rails or high T-rails, as they cover too much surface to be installed on the T-rails with comparatively low webs. There a terminal like those used on switchboards can be applied with better results.

To install the larger terminal a hole is first drilled of the proper size, and then that portion of the rail which will be covered by the terminal is brightened, either with a grinder or by means of chipping away the dull surface with a chisel, using only light hammer blows. Of the two methods of polishing the rail the latter, though requiring more time and labor, will give the better surface, as the solder will adhere better to the roughened surface than to the smooth one. The terminal is tinned and the back next to the rail has grooves cut into it so that the solder will flow down



DIAGRAMS OF SPECIAL TRACKWORK BONDING



AT LEFT, CONNECTING RAIL AND BONDING CABLE WITH HALVES OF BONDS. AT RIGHT, BOLTED AND SOLDERED TERMINALS

insulated and so are the joint bonds, so that the insulation is not needed at the special work if used nowhere else on the line.

For attaching the wires to the rails many companies use compressed or pin-expanded terminals, either special terminals supplied by the manufacturers or ends of cable bonds which have been cut in two so that each bond supplies two terminals. Still others weld the bond to the rail, but this requires special equipment and is expensive.

BOLTED AND SOLDERED TERMINALS FAVORED

The best comparatively cheap method of attachment that has come under the observation of the writer is by means of the use of a bolted and soldered terminal of the type shown in an accompanying illustration. These

behind the terminal. The rail is heated with a blow torch and the terminal sweated on and drawn up tight to the rail by means of the bolt.

In large carhouses or storage yards and at terminals, there is, at times, so much special work that to bond each piece separately would be a very expensive proceeding and at such points heavy cross bonds bonding all of the tracks together and other leads from these cross bonds or from portions of the trackage in the yard or terminal are run out to the main line tracks beyond the last of the special work.

While it is necessary to use such special construction at some few places, yet whenever possible standard methods of bonding should be adopted for each type of special work and these standards adhered to. Accompanying diagrams show the way in which most of the

standard types of special work can be bonded. In these diagrams, although but a single wire is shown attached to each of the rails, yet it will be noticed that two terminals are used to make this connection. This is just a safety precaution to insure that the circuit will be continuous even if one terminal should by some means become loosened from the rail or the conductor.

In some cities it is the practice to bond across the special work with wires having the same total conductance as that of the rails on each side, but this should not be necessary, as the increased drop across infrequently used pieces of special work should lower the potential of the line by such a negligible amount as to make the difference unnoticeable and there should never be enough current returning through the rails to heat up the wires or connections enough to endanger them.

BOND TO ELEVATED STRUCTURE WHERE POSSIBLE

Where there are steel elevated structures running toward the power or substations it is nearly always well to take advantage of the high conductance of the large mass of metal composing them and therefore all lines crossing underneath them should be bonded to them. One of the illustrations shows a good method of doing this. The connections to both the rails and the column of the elevated structure are usually made with bolted and soldered terminals, although sometimes the method of using halves of bonds with the terminals compressed into the rails, as shown in the drawing, is used. Occasionally the leads to the metal structure have been continued in the pipes up the columns to the girders, but this is unnecessary if the columns and girders are bonded together and it costs much less to install the bonds between them than to extend the wires to the top of the columns.

Sometimes the pipes are run up the columns to a height of 8 or 10 ft. above the ground line and the wires connected to the column there, the pipes protecting the wires from injury or theft. However, the method shown in the drawing, where the wires are attached near the foot of the column but a little above the ground line, is cheaper and perfectly satisfactory if the wire and terminals are protected. Where latticed or similar types of columns are used it is best to place the terminals inside of the column to protect them and then to seal them there by filling up the lower portion of the column with concrete.

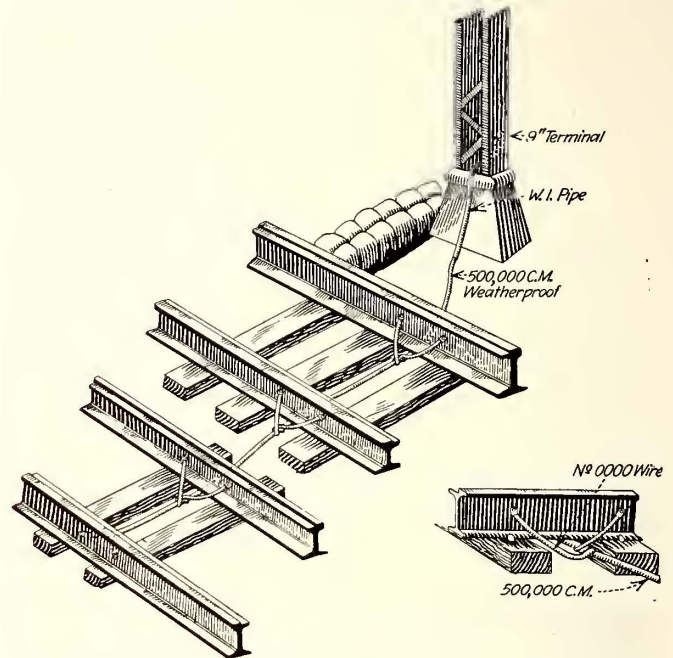
Another condition which requires special bonding is where the tracks or other returns cross a river or other navigable body of water on a bridge the height of which is not great enough to permit of vessels passing underneath and where a draw must be opened to allow them to go through.

This condition may be treated in either one of two ways, depending upon whether the tracks across the river from the source of power are completely separated from the station, or whether, through cross bonding with other tracks, there is another path or other paths by which the current may return to the negative bus. In the latter case the opening of the draw, although it may increase the return drop a little, but only for a short time, will not interfere with the service or produce any situation which may be dangerous to any pipes or cables on account of electrolysis. All that is necessary then is so to arrange the bonding that as soon as the draw is closed the return circuit will also be closed.

This can generally be done in a satisfactory manner

by installing on the draw spring contacts which will touch each other when the draw is closed, these contacts coming together with a rubbing motion so as to insure clean surfaces when they touch.

For rolling-lift bridges there is no difficulty in making such contacts, which, of course, should be bonded to all of the rails on the bridge. Nor is there any difficulty in the case of swing bridges if the two arms of the draw are both of the same length. Where one arm is a few inches longer than the other, as sometimes happens, the making up of spring contacts that will work satisfac-



CONNECTING SURFACE TRACKS TO STEEL COLUMN

torily is almost an impossibility if the bridge is handled as such bridges generally are.

If the bridge is swung open to allow a vessel to pass through and then swung back in the opposite direction to close the draw, well and good; the contacts will touch properly and there will be no trouble. But time can be saved and the draw closed more quickly if the direction of movement of the draw is not reversed and instead if it is swung in a complete semi-circle, following the boat through. This brings the short arm of the bridge on the side where the long one had previously been and opens a gap there unless the spring on that side is so abnormally long as to make almost certain that it will be broken when the long arm shall swing around again.

Where contacts on the bridge cannot be used it is necessary to install conductors of some sort all of the way across the channel, either overhead on extra long poles, something which is seldom done, or under water by sinking the wires or other conductors to the bottom of the stream. It is not necessary that regular submarine cables be used in this service, for bare copper conductors will be almost as satisfactory, although they will deteriorate more quickly, especially if the water is at all salt. In such locations the electrolytic action of the current leaving the wire at the surface of the water can very easily be noticed, and after the wire has been in service for a time the copper strands will show signs of having been eaten away at the point where the current leaves them. Where there is much of a rise and fall to the tide this point of weakness may be spread

over a distance of several feet, so that the destruction of the wire will take place much more slowly than when the corrosion is confined to a smaller area.

Except in very deep waters it is well to make sure that the wires will sink well into the mud at the bottom, either by their own weight or by being put into position by divers. If this is not done there is danger of the wires being carried away by either the hulls or anchors of passing boats. The writer knows of one case where, to protect the return circuit and insure that

the conductors in the stream would not be destroyed by passing boats, electrolysis or thieves, they were made of a number of old rails cast welded end to end and sunk in the stream. They were welded together on the shore and drawn into the water by means of a flat car crossing the bridge, their weight causing them to bend at the ends enough for the center to rest on the bottom of the creek, while the ends projected above the water on the banks and were there connected to the track rails by means of short pieces of wire buried in the roadbed.

Principles to Be Followed in Tie Plate Design

Tie Plates Used Under Rails Reduce the Fiber Stresses in the Ties—When Plates Are Purchased Under Specifications the Cost of Inspection Is Small

BY HOWARD H. GEORGE

Assistant Engineer Public Service Railway of New Jersey

THE question of tie-plate design and its effect on the tie is one of the important problems that confronts the track maintenance engineer. It has received a great deal of attention and study through the efforts of the various committees of the American Railway Engineering Association, under whose direction a number of tests and experiments have been made.

The committee that was responsible for the development of the standard specifications of the A.R.E.A. evolved, among others, the following principles that should be followed in the design of tie-plates which are equally applicable to electric railway practice. (See Proceedings, Vol. 14, p. 93):

The plates shall not be less than six inches in width and as much wider as is consistent with the class of ties on which they are to be used.

The length of the plates shall not be less than the safe bearing area of the ties divided by the width of the plate, and, when made for screw spikes, shall be so shaped as to provide proper support for the screw spike.

The thickness of the plate shall be properly proportioned to its length.

The distance from the edge of the rail base to the end of the tie-plate on the outer side must be uniform, and in excess of the projection inside of the rail base.

Where treated ties are used or where the plates are for screw spikes, a flat bottom plate is preferable. Where ribs of any kind are used on base of plate, these shall be few in number.

The punching must correspond to the slotting in the splice bars and, where advisable, may be so arranged that the plates may be used at joints. Spike holes may be punched for varying widths of rail base where the slotting will permit such punching without the holes interfering with each other and when the plate is of such design that the additional holes will not impair its strength.

There has been much discussion among steam railroad engineers as to the minimum thickness of plates required at the edge of the rail base. Some have argued for a minimum of $\frac{3}{8}$ in. while others have maintained that a thickness of $\frac{1}{2}$ in. gives more satisfactory results. Of course it is entirely a matter of respective loading and the kind of timber in the tie on which the plate is used. In the case of electric railways it is not felt that the load requirements would ever justify specifying a thickness in excess of $\frac{1}{2}$ in. and a thickness of $\frac{7}{16}$ in. will generally be found to be ample, regardless of the kind of timber in the tie.

Some railroads are using an inclined tie-plate, the maximum thickness of which is $\frac{3}{4}$ in. and the minimum

less than $\frac{3}{8}$ in. In addition the plate is cambered lengthwise of the rail, this giving a line contact instead of a surface contact between the rail base and the tie-plate, which line of contact is always at some point between the two edges as the rail flexes under moving loads. It eliminates the concentration of the load on the near and far edges of the tie plate as the loads approach and recede. One large railroad has adopted a tie-plate of this design as its standard. The inclination tilts the rail inward and is designed to make the resultant force due to a wheel load on the rail and the wedging action due to the coning of the wheels, which are at right angles to each other, coincide with the center of the rail. Some few engineers have at various times argued to eliminate coning, but they evidently were not very well informed as to the reason for its use. As a matter of fact, it is absolutely necessary for the safe operation of a railroad. Wheels were first made with flat treads, but they soon tore to pieces the metal strips used for rails and the wheel flanges as well, so that it early became necessary to introduce coning as a matter of safety. It eliminates excessive rubbing of the flanges against the side of the rail head. When the flange approaches the rail that wheel is turning on a larger diameter than the other wheel on the same axle, and because they are rigidly fixed on the axle the wheels are caused to swerve in the other direction slightly until a corresponding action takes place on the other rail.

Tests have been made at Purdue University to determine the relation of the crushing strength of different ties with and without tie-plates. (See Proceedings A.R.E.A., Vol. II, p. 844). It was found that the fiber stresses per unit of area of the wood under the tie-plate at the elastic limit in the case of the oak tie were less than those under the rail alone, with the exception of one type of tie-plate that was tested. Of course, the total load was greater. This was accounted for by the perceptible springing of the tie-plates, thus producing a non-uniform pressure on the wood under the plates. Therefore, the loads carried with the aid of the tie-plate, while larger, were not increased in the same ratio as the increase of the bearing surface. In the loblolly pines and in the case of one type of tie-plate tested on red-oak ties, no perceptible springing of the tie-plates was observed within the elastic limit of the timber,

the load being increased in practically the same ratio as the surface. These facts must be given careful consideration in designing tie-plates for use with any particular kind of timber. The primary purpose or function of a tie-plate is to protect the tie from mechanical wear, and all other functions should be subordinated to this. Of course, the brace tie-plate also must act as a brace and care must be taken in its design to obtain a good fit and in the specifications to see that the permissible variation in the dimensions shown does not defeat this object. Assuming, however, that the tie-plate will be of sufficient area properly to distribute the loads imposed, and that it is of sufficient thickness to prevent buckling, it is necessary that the movement between the plate and the tie be reduced to a minimum or eliminated if possible. Otherwise, due to impact, the force of the blow delivered soon crushes the tie and renders the tie-plate ineffective, the crushed wood fibers permitting the retention of moisture and hastening decay. Also care should be taken to see

that there is no chance for lateral movement of the rail across the plate and that the distance between the inside faces of the spike holes is not greater than the width of the rail base. Excessive rail movement causes excessive wear on the spike itself and should be prevented as far as possible.

It is recognized that it is the best practice to require that all holes be punched from the top of the plate. This insures a smooth surface for the rail bearing. However, there may be special cases where holes will have to be punched from the bottom, where it is not practical to punch from the top.

Probably no other track fixture deteriorates so rapidly from rust as the tie-plate. Many engineers favor coating all plates with oil before shipping from the mill to retard this corrosive action as much as possible. However, opinion as to the value of such an oil coating is divided. The New York Central Railroad made some tests a few years ago of some steel plates coated with linseed oil and found that they began to rust within

Steel Tie Plates

1. Material:

The plates shall be made of bessemer or open-hearth steel.

2. Physical Tests and Properties:

The steel in the tie-plates shall conform to the following requirements:

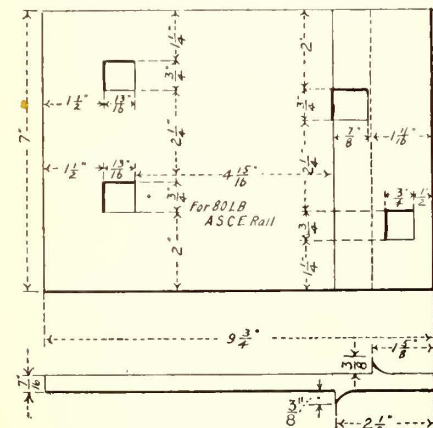
(a) Ultimate strength, not less than 55,000 lb. per square inch.

(b) Elastic limit, not less than 50 per cent of the ultimate strength.

(c) Elongation, not less than 20 per cent in two inches.

(d) Reduction of area, not less than 40 per cent.

(e) Plates shall bend cold for 90 deg. without showing any sign of fracture.



STANDARD SHOULDER TIE PLATE

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:

Subject to the following allowances, the form and dimensions of the plates shall conform to the drawings submitted to the manufacturer:

(a) The length and width of the

bearing surfaces of both plain tie-plates for T-rail and brace tie-plates for girder rails shall not vary more than $\frac{1}{8}$ in. from the dimension shown.

(b) The thickness of the metal in the plates shall not vary more than $\frac{1}{32}$ in. from the dimensions shown.

(c) All variations in length shall be left on the inside end of the plate.

(d) In the case of shoulder tie-plates, the distance from the shoulder to the outside end of the plate must be made uniform.

(e) In the case of brace tie-plates, the height of the brace above the top of the bearing plates shall not vary more than $\frac{1}{32}$ in. from the dimension shown on the drawing.

(f) The spike holes must be punched from the top, clean cut, without burrs, and the plates must not be cracked or bent out of shape in punching the holes.

(g) All plates must be stamped on the top side, outside of the base of rail, with the section and weight of rail.

(h) The plates shall be free from burrs and imperfections.

4. Inspection:

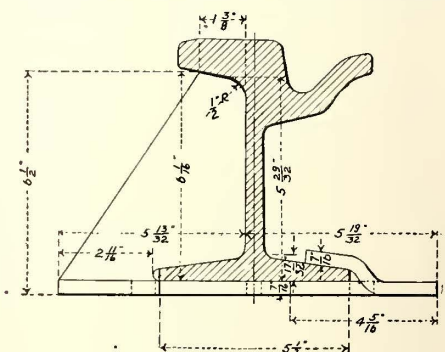
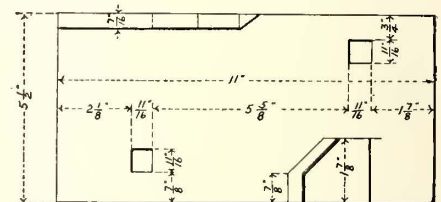
When required, the manufacturer shall furnish samples of tie-plates from a preliminary rolling before proceeding with the filling of the order, and shall give sufficient notice in advance of the date when they will be ready for inspection.

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 plates 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.

Tests shall be made of samples of the finished product selected by the railway company's inspector from each lot of fifty bundles. Two (2) 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



RAIL BRACE FOR 116-LB. RAIL

be selected from the same lot and tested. If it meets the requirements the lot will be accepted, but if it fails the lot will be rejected.

If, after shipment, any tie-plates are found to be defective, due to material or manufacture, they may be rejected.

5. Shipping:

Tie-plates shall be wired together in bundles, the weight of which is not to exceed 100 lb., and shipped with a uniform number in each bundle.

two or three months when exposed to ordinary weather conditions. Since storage of such fixtures as tie-plates is generally made in the open or under open sheds, they are more or less exposed to the weather and corrosion is apt to be very rapid, especially where they are exposed to salt air. On our own property, it has been the practice to require the manufacturer to coat all tie-plates with red lead before shipping, and this has been found to give excellent results. If not protected in some way, steel tie-plates are very apt to go to pieces very rapidly before they get into the track.

The inspection cost of the plates is very small. It amounts to only about 20 cents per net ton at the present time. The brace tie-plate shown with the accompanying specifications, for example, weighs approximately 10 lb., so that the cost of inspection would only be about one-tenth of a cent each.

Shockless Crossing on Pacific Electric

Special Type of Crossing Placed in Test at Heavy Traffic Center in 1917 Is Giving Good Satisfaction

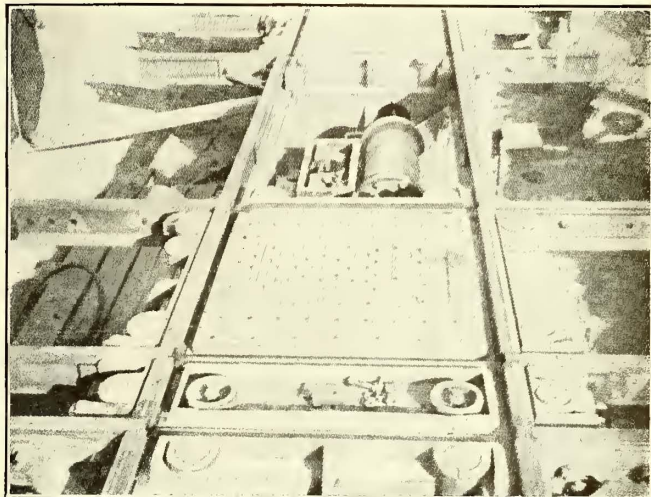
BY CLIFFORD A. ELLIOTT

Cost Engineer Pacific Electric Railway, Los Angeles, Cal.

IN AN article in the *ELECTRIC RAILWAY JOURNAL* for Feb. 21, 1920, I mentioned, in a table of various crossings, that the Pacific Electric Railway had installed a Cobb shockless crossing* for a test. This was installed during the year 1917 and in order to give the crossing as severe a test as possible it was placed at the intersection of Fourth and Main Streets, Los Angeles, which is a heavy traffic center where the narrow-gage Los Angeles Railway's double tracks cross the double-track combination gage jointly operated by the Pacific Electric and Los Angeles Railways. Since installation over 4,000 movements per day have been successfully handled.

This type of crossing is automatic and the mechanical parts are electrically operated. The track intersections, as shown in an accompanying illustration, are composed of movable rails mounted on eccentrics or cams that are keyed to shafting directly under the rails. One set of the rails is in "down" position, while the other is elevated to a level with the corresponding tracks. This makes a continuous rail over the crossing. The detached rails are lowered about $1\frac{1}{2}$ in. to allow the flanges of the car wheels to pass over them without striking. The shafting upon which the cams are mounted is turned by means of a cylinder and piston operated by compressed air. This cylinder is similar to the brake cylinders used in connection with air brake equipment. Compressed air is supplied by an automatically controlled compressor which is installed in the basement of an adjoining building. A conduit line extends underground from the crossing to the air plant. The average monthly consumption for the operation of this plant has been 8 kw.-hr. and the maintenance expense of the crossing has been comparatively small. The illustration shows the manner in which manhole covers may be removed for any attention necessary to the mechanism of the crossing. When cars approach the crossing they pass onto an insu-

lated section of track. Relays are thus energized, which in turn control electrically operated air valves. These air valves supply air to the cylinder for operating the crossing rails. Each approach has a separate set of relays so the crossing is automatically set for the car or train that has the right of way over the crossing. Powerful interlocking devices preclude any possibility of failure, but as an additional safeguard



SHOCKLESS RAILWAY CROSSING WITH ONE MANHOLE COVER REMOVED

cams, shafting, mountings and bearings are made of strong construction so that they will elevate the heaviest locomotive in operation on any road at the present time. The Pacific Electric Railway now operates three-car interurban trains, which consist of some of its heaviest types of equipment, over the crossing daily. The weight of these cars is 107,000 lb.

More Information on Burning Holes in Rails

Tests Made by Great Northern Railway with Burned Holes in Web of Rails Indicate This Practice Is Not Safe

BY JULIUS H. GOOD

Inspecting Engineer Great Northern Railway, St. Paul, Minn.

IN THE issues of the *ELECTRIC RAILWAY JOURNAL* for May 1 and July 24, 1920, reference was made to the use of burned holes in the web of rails. The Great Northern Railway has carried on some quite extensive experiments in this direction, the results of which may be of interest to electric railway men.

In August, 1919, we started welding frogs and cutting track material on quite an extensive scale with the oxyacetylene flame. A considerable amount of cutting and perforating of rails was done, principally on sidetracks and in yard work. This method proved economical and quite a labor saver. However, during the following winter several rails with perforated holes in the web broke in service. This naturally led to an investigation regarding the safety of this practice, especially where rails were used under high-speed mainline traffic. Instructions were immediately issued limiting the practice to use on side tracks and yard work and some extensive laboratory tests were instituted at the Gary mills, in conjunction with the Illinois Steel Company, to determine the relative safety of drilled and

*Details of the Cobb crossing will be found in the issues of this paper for May 22, 1915, and Oct. 7, 1916.

burned holes in rails. These tests were made while the plant was rolling 3,200 tons of 90-lb. section rail for our company.

For making the tests we cut up two G. N. 9036 rails into 4-ft. lengths and numbered them consecutively from one to twelve inclusive. The odd numbered pieces were drilled with a 1 $\frac{1}{8}$ -in. hole through the web at the center and the even numbered pieces had the same size hole burned by the oxyacetylene process in the same location. The first six pieces were tested to destruction in a drop-test machine and the other six pieces were given pressure tests in a Riehle machine in the laboratory. The impact test with the drop-testing machine used a tup of 2,000 lb. with a height of drop of 13 ft. and with 36 in. between centers of supports. Results are given in the order in which they were made:

1. Drilled sample. Broke through a flaw in the base of the rail clear of the hole on the first blow.

2. Sample with burned hole. Broke through the hole at the first blow.

3. Drilled sample took a permanent set of 1.1 in. on the first blow and broke through the hole on the second blow.

4. Sample with burned hole. Broke through the hole in an angular direction on the first blow.

5. Drilled sample. Took a permanent set of 1.1 in. on the first blow, 1.8 in. on the second blow, and then broke square on the third blow.

6. Sample with burned hole. Broke angular through the hole on the first blow.

The results of these tests were not entirely satisfactory, so it was decided to finish the remaining tests by the static method in the Riehle testing machine, so that a unit of measurement could be secured, and therefore a better comparison made. The capacity of this machine is 300,000 lb. Rails were placed in the machine with the same centers as used in the drop tests, that is, 36 in. Tests were made on three samples with drilled holes and three with burned holes. The results are given in tests No. 7 to 12 inclusive.

7. Sample with drill hole stood a load of 162,000 lb., then broke squarely through the hole. The break indicated some segregation in the web.

8. Sample with burned hole stood a load of 117,000 lb., then broke squarely through the hole.

9. Sample with drilled hole stood a load of 189,000 lb., then broke through hole.

10. Sample with burned hole stood 102,000 lb. and then broke irregularly through the hole.

11. Sample with drilled hole stood a load of 117,000 lb. and then broke squarely through the hole.

12. Sample with burned hole stood load of 116,000 lb. and then broke squarely through the hole.

From the above it will be seen that the pieces of rail with drilled holes took an average of 174,000 lb. to break through the section, and the ones with burned holes an average of about 110,000 lb., or a difference of about 64,000 lb. in favor of rails with drilled holes.

Further tests were made by taking 4-ft. pieces of sound section rail with no holes in the web and testing these to destruction in the Riehle machine. These stood an average of 226,400 lb. load and then broke squarely through the section at the center.

Further drop tests were made on a number of rails from six different heats after the regular tests for the inspection had been made. In this special test

the height of drop was 17 ft. and the weight of the tup was 2,000 lb. The results of this test are given in the accompanying table.

RESULTS OF DROP TEST				
HEIGHT OF DROP 17 FT. WEIGHT OF TUP 2,000 LB.				
Heat Number	Ingot No.	No. of Blows	Permt. Set	Remarks
50126	2	1	1.30	Twisted out of shape.
	2	2	2.25	
	..	3	3.00	
	..	4	....
..	23	1	1.30	Broke through flange account of slight segregation.
	..	2	....
53101	2	1	1.45	Broke through section.
	..	2	2.50	
	..	3	3.30	
	..	4	....
..	..	1	1.45	Broke through section.
	..	2	2.45	
	..	3	3.35	
	..	4	....
52115	13	1	1.30	Broke through section.
	..	2	2.10	
	..	3	3.05	
	..	4	....
..	23	1	1.50	Broke angular through section.
	..	2	....
39093	23	1	1.40	Broke through section.
	..	2	2.55	
	..	3	3.40	
	..	4	....
..	2	1	1.45	Broke through section.
	..	2	2.50	
	..	3	3.45	
	..	4	....
30123	2	1	1.55	Broke through section.
	..	2	2.65	
	..	3	3.80	
	..	4	....
..	13	1	1.60	Broke through section.
	..	2	2.70	
	..	3	3.90	
	..	4	....
48100	13	1	1.60	Broke through section.
	..	2	2.70	
	..	3	3.55	
	..	4	4.10	
	..	5	....
..	23	1	1.55	Twisted out of shape—head and web broke.
	..	2	2.65	
	..	3	3.65	
	..	4	4.10	
	..	5	....

Our conclusion from these tests was that the practice of burning holes in the web of rails is unsafe, since the rails were weakened more than with drilled holes, and that the use of this method should be limited to yards and sidings.

Civil Service Vacancies

THE Civil Service Commission announces an examination on Sept. 22 to fill a vacancy as purchase agent at the Watertown Arsenal, Mass., at \$2,400 per year and other vacancies requiring similar qualifications. After six months' satisfactory service appointees may receive a \$20 per month increase. The highest eligibles nearest the vicinity at which the appointee is to be employed will be certified. All citizens over twenty-one are eligible to qualify.

Applicants must have had at least two years' experience as purchasing agent or assistant in the buying of machine, electrical, foundry, woodworking and forge shop supplies.

On Sept. 28 examinations will be held to fill vacancies in the Bureau of Public Roads at an entrance salary of \$1,500 and grade of junior civil engineer. No formal examination will be held, but competitors will be rated on experience, training, education and physical ability.

Applicants should apply for Form 1,312 to the Civil Service Commission, Washington, D. C.

Carbon Brush Testing

The Several Materials Which Enter Into the Composition of Carbon Brushes Are Discussed, Together with Methods Used for Testing Brush Quality

BY JOHN S. DEAN

Railway Motor Engineering Department Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa.

BEFORE going into the details of testing carbon brushes it seems logical that some general information regarding the raw materials, various types, method of manufacturing and general characteristics of brushes be reviewed in order to lay a broad, well-grounded foundation for a more intelligent understanding of this subject. The materials used consist of carbon and pitch. Carbon is a non-metallic element found in both crystalline and amorphous (non-crystalline) forms. Amorphous carbon may be obtained in the form of coke or lampblack. Natural graphite is carbon in crystalline form which is mined in many localities, and artificial graphite is obtained by heating amorphous carbon, such as coke, in an electric furnace to change its structure to a crystalline state. Pitch, commonly used as a binder, is obtained as a residue in distilling coal tars.

Depending upon their composition, brushes may be divided into seven classes:

1. *Carbon graphite*—Known as the ordinary carbon brush and consisting of amorphous carbon in the form of coke, with a small percentage of graphite and binder.

2. *Graphite carbon*—With either a mixture of a large percentage of artificial graphite, some coke and binder, or with a mixture of a large percentage of natural graphite, some coke and binder.

3. *Electro-graphitic*—Consisting of (1) and (2) graphitized by special electrical treatment.

4. *Graphite*—Made of natural graphite and binder.

5. *Impregnated*—Consisting of carbon graphite brush treated with a lubricating material.

6. *Metal graphite*—Made of a mixture of graphite, powdered metal and binder.

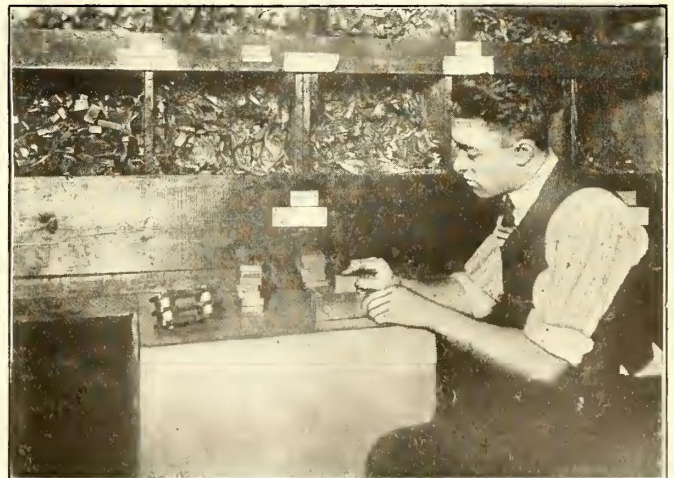
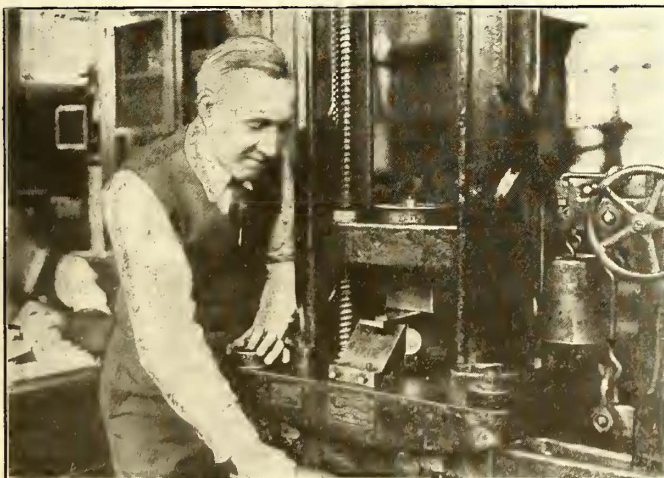
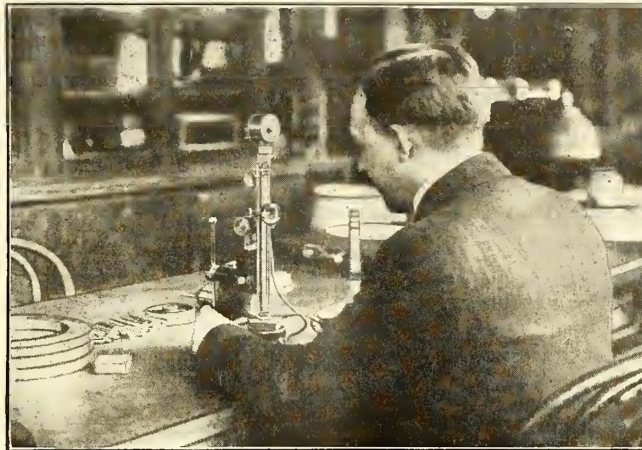
7. *Compound brush*—Consisting of alternate layers of carbon and metal.

The following four types are most suitable for railway work. They are listed in the order of their value with reference to the best all-around results obtained in service: (1) Electro-graphite and (2) graphite carbon, both used with commutators having mica undercut; (3) impregnated, used with commutators where it is impracticable to undercut the mica, and (4) carbon graphite, used with commutators having mica undercut.

TWO COMMON METHODS OF MANUFACTURE

The most common two methods of manufacturing carbon brushes are termed the extruded or squirted method and the molded or machined method. In the

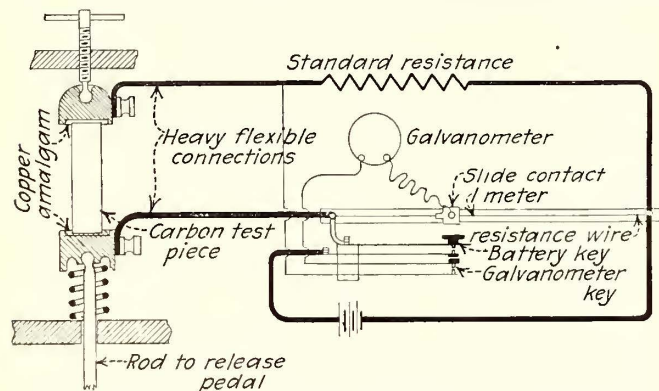
former of these the material in the form of pulp is forced through a metal die under pressure and then cut off to the desired length and baked at a high temperature to carbonize the bond and permanently set the material. This method is used in making the cheaper grade of carbons, which do not have the strength to resist the breaking and chipping in service. The "molded or machined" method consists in molding the material into blocks



AT TOP, HARDNESS TEST APPARATUS. AT LEFT, STRENGTH TESTING MACHINE. AT RIGHT, CHECKING CARBONS FOR THICKNESS

under heavy pressure and then baking it. Carbons are cut from these blocks and machined to exact size. This method is used in making high-grade carbons and gives a brush of uniform texture and strength that is best suited for railway work.

For railway work it is the most common and considered the best practice to use graphitized unplated



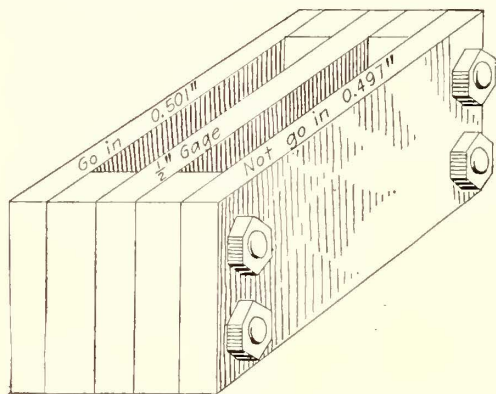
SCHEMATIC DIAGRAM OF SPECIFIC-RESISTANCE TEST APPARATUS

carbons, without shunts or pigtails. In general this type of brush requires the following shop operations to produce the finished carbon from the raw material.

Starting with the raw material, it is crushed, calcined or carbonized, cooled, milled, mixed, again cooled, remilled, molded, packed in furnace, gas baked and electrically baked or graphitized.

The preceding operations produce the unfinished rough carbon blocks, which are then sawed to approximate size, side planed, edge planed, end planed, washed and dried, when the wet process of grinding is used, then cooled, stamped, when not marked during the molding process, chamfered on the corners and finally inspected, which produces the finished brush ready for shipment.

In connection with the manufacture of the many grades of carbon brushes best suited to the various



MAXIMUM AND MINIMUM GAGE BOX

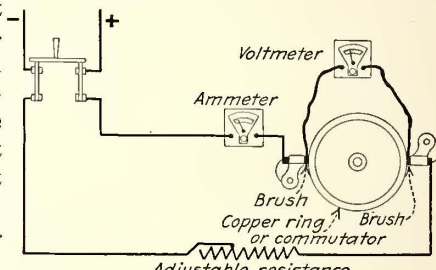
requirements of different service conditions the physical properties of the brush shown in Table I must be considered:

TABLE I—PHYSICAL CHARACTERISTIC OF BRUSHES	
Characteristics...	Electrical..... { Specific resistance Contact drop Current-carrying capacity
	Mechanical.... { Coefficient of friction Hardness Toughness or strength Abrasive-ness Density Thermal conductivity Dimensions

One of the most important factors associated with carbon brushes, in which both the consumer and manufacturer are vitally concerned, is the uniformity of the product. This is of the utmost importance from the operator's standpoint. He, after deciding to use a certain grade of carbon, which best meets his operating conditions as determined by a long series of service tests on sample carbons, depends entirely upon the reliability of the manufacturer to continue to supply this grade of carbon with similar characteristics on all future shipments. If for any reason this is not done and some of the carbons in service do not measure up to the samples furnished there is a strong inclination on the part of the operator to discontinue using this brush.

TESTS NECESSARY TO ASSURE UNIFORM PRODUCT

The manufacturer, realizing the above condition, takes all precautions to insure a uniform product in the various grades of carbons manufactured. To accomplish this a careful inspection and test must be made of the raw material as it is received and during the processes of manufacture, as well as of the finished carbons. These tests are made on samples taken from approximately 10 per cent of the materials and finished carbons. They are outlined here to show the user of railway motor carbons to what extent precautions are taken to produce a uniform and reliable carbon brush best suited to meet the requirements of railway operating conditions.



SCHEMATIC DIAGRAM OF CONTACT-DROP APPARATUS

Specific Resistance—The specific resistance of a brush is the electrical resistance of a unit* cube of the material measured between opposite surfaces, expressed in ohms. For measuring this a testing outfit, consisting of the well-known Wheatstone bridge, with the carbon test piece as one leg and the standard resistance as a second leg, and the adjustable divisions of a one-meter resistance wire as the other two legs in the bridge is used. This is shown in an accompanying illustration. The test specimen consists of a 1/2-in.-square section of carbon 2 1/2 in. long, having, therefore, a resistance ten times that of an inch cube.

The test piece is clamped between two heads, one of them adjustable and the other spring supported. The contact between the carbon and these two heads is reduced to a minimum by the use of copper amalgam paste or copper gauze. A setting of the sliding contacts on the wire is obtained where there is no deflection on the galvanometer when the circuit is closed by pressing the double key. This balance gives a relative resistance of the carbon test piece and the standard resistance unit. By reference to a computed table the resistance can then be obtained without the necessity of calculating the values in each individual case. Another method quite generally used is the voltage-drop method, where a known current is passed through the carbon test piece and the voltage drop across a known length of the carbon is determined. The resistance is then calculated by Ohm's law.

The specific resistance depends on the composition of

*Here taken as 1 in.

the brush and varies from 0.0025 ohm to 0.0001 ohm. The specific resistance of a good grade of electro-graphitic railway motor brush should be about 0.0015 ohm.

Contact Drop—The electrical contact drop of a brush is the sum of the differences in potential between the positive brush and the commutator surface, and the commutator surface and the negative brush. This contact drop is determined by means of special apparatus consisting of a motor-driven flat copper disk and two brushes in contact with the vertical face of the rim. The current passes through the positive brush to the wheel and out at the negative brush. The voltmeter leads are connected one to each brush as near to the brush face as possible. The voltmeter then reads the drop between the brushes.

The size of the test piece will vary in accordance with the general design of the holder. The use of a piece of brush with one square inch cross sectional area will simplify the computation to a considerable extent. Special brushes are required for this test, each of which must have two pigtails, for connection in the ammeter and the voltmeter circuits respectively.

The test specimens are inserted in the holders and the apparatus is operated for some time with the current flowing until a characteristic surface has been formed. The brush pressure, current density and peripheral speeds are then adjusted and readings are taken, giving the contact drop from brush to brush at the current density brush pressure and peripheral speed used.

The value obtained for the contact drop is determined largely by the material in the brush, the pressure between brush and commutator, the current density and the condition of the surface of the commutator and the brush face, and will vary from 1.25 to 2.75 volts. Accompanying graphs show the variation of contact drop due to change in brush pressure and current density. The contact drop of a good grade of electro-graphitic brush suitable for railway work should be about 2.1 volts.

The current-carrying capacity of a brush is the density of the current that the brush can carry continuously without serious heating, expressed in amperes

per square inch of contact surface. Not only the actual load current of the machine is considered in this connection but also the short-circuit current that the brush must carry.

There is no laboratory method of testing a brush for this characteristic. It is dependent on so many factors that a test other than operation under service conditions would have but little meaning. Fundamentally the carrying capacity of a brush is limited by the temperature reached at the contact face and all conditions having influence on this temperature affect the carrying capacity in a given instance. It is the practice of carbon manufacturers to rate brushes in this respect in accordance with what they have observed the brush will carry in service without distress. Ratings given are for continuous service, so that intermittent service such as is encountered on railway motors will

permit the use of higher current density than the standard rating of the brush would indicate.

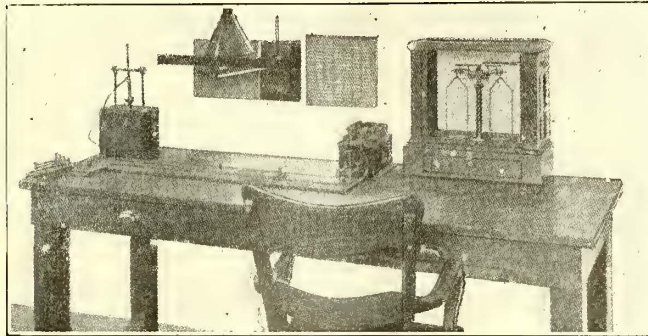
The current-carrying capacity depends on the composition of the brush, specific resistance, contact drop, coefficient of friction, thermal conductivity of the brush itself and the radiation factor of the machine in operation. It will vary from 35 to 70 amp. per square inch, the value for

a good grade of electro-graphite brush suitable for railway work being about 50 amp.

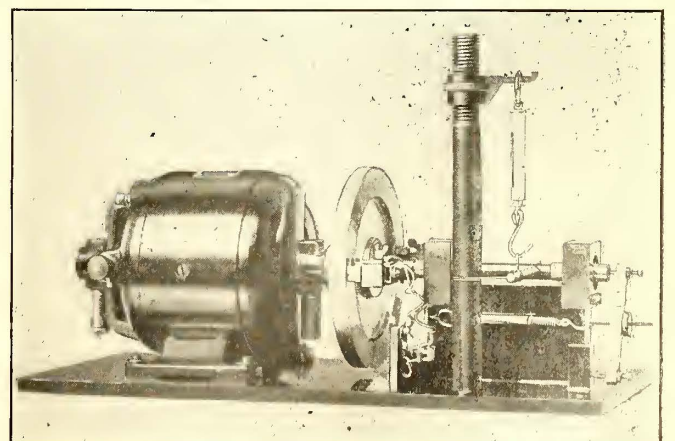
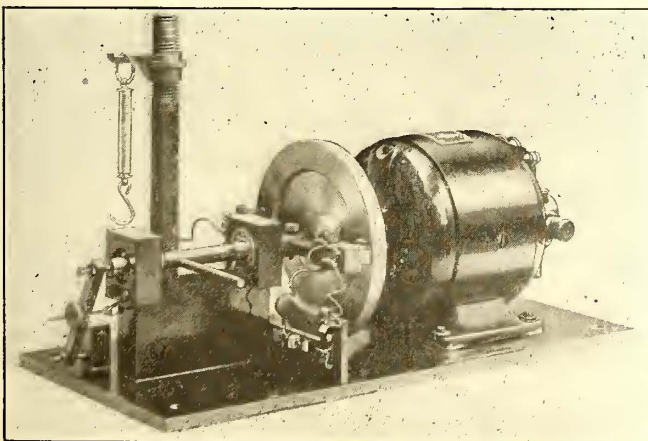
Coefficient of Friction—The coefficient of friction of a brush is the ratio of the force preventing rotation (the tangential pull exerted by the commutator upon which the brushes bear) due to friction of the brushes, to the force pressing the brushes (radial pressure applied at the brush face) down upon the commutators, that is, to the total pressure on the brushes.

The machine used for measuring contact drop is also used in measuring the coefficient of friction. In this machine the brushholders are placed on a counter-balanced arm to which is attached a vertically hung spring balance which registers the pull due to the brush friction.

The test specimen used for the contact drop test is utilized for this also, preferably with 1 sq. in. cross sectional area. In this test pigtails are not necessary.



SPECIFIC-RESISTANCE TEST APPARATUS



TWO VIEWS OF CONTACT-DROP AND COEFFICIENT-OF-FRICTION TEST APPARATUS

In making the test, brushes are placed in the holder and the motor is operated until the brushes are well seated. It is advantageous to run this test immediately after the contact drop test, as it is then unnecessary to remove the brushes from the holder. With the above apparatus it is possible to hold the current density and brush pressure constant, while data for a curve between coefficient of friction and peripheral speed are made, or by holding the speed constant data for a friction pressure curve may be obtained. From the readings on the springs balance the dragging force is calculated by the law of moments as follows:

$$F = \frac{R \times P}{r}$$

where

F = dragging force.

R = radius at which dragging pressure on vertical spring balance is measured.

r = radius at which brush makes contact on revolving disk.

P = pull on vertical spring balance.

By using this value of F and the brush pressure on horizontal spring balance F_1 the coefficient of friction is readily calculated by the same principle. The coefficient of friction is subject to a wide variation due to the peripheral speed of the commutator, brush pressure and composition of the brush, as well as the process of manufacture. This value will vary from a little above zero to 0.75. On account of this wide variation, brush engineers

have, for convenience, classified brushes as "high," "medium" and "low," depending on the coefficient of friction. Accompanying graphs show the variation of the coefficient of friction due to a change in peripheral speed and the effect of a change in brush pressure on the coefficient of friction. The coefficient of friction of a good grade of electrographite brush suitable for railway work should measure about 0.22.

Hardness—The hardness of a brush relates to the compactness of the mass of the brush as a whole and depends on the cohesion of the particles on its surface, as determined by its capacity to scratch another or to be itself scratched. It is expressed by a figure which shows a relative measure of ability of its surface to resist penetration. There is no absolute unit of hardness, and the readings obtained on the scleroscope are relative figures, which are useful only for the purpose of comparison, but which are very essential as a check on the uniformity of the product. The hardness figures as determined are usually an indication of the strength of the brush. A scleroscope is shown in an accompany-

ing illustration. For the scleroscope test the finished carbons or any small piece of carbon with a smooth polished surface can be used. The sample carbons are placed on the heavy base plate of the instrument directly under the graduated glass tube which contains a diamond-point hammer. The hammer is made to drop from a fixed height upon the test piece of carbon. The rebound of the hammer is measured by means of a fixed scale graduated from 0 to 100.

Results obtained vary from 10 to 75 for brushes, depending upon the material and methods of manufacture. Brushes are graded according to their scleroscope readings as follows:

Scleroscope Readings	Degree of Hardness
0-15	Very soft
16-30	Soft
31-45	Medium
46-60	Hard
61-75	Very hard

A good grade of electro-graphitic brush suitable for railway work should have a hardness figure of about 60.

Toughness—A brush is tough or strong when it will

endure the application of force without breaking or yielding, possessing the quality of flexibility without brittleness. The strength of a brush determines its ability to withstand chattering in the carbon box without chipping or breaking. It is expressed in pounds per square inch.

A special testing machine is used for making this test and test carbons are cut $\frac{1}{2}$ in. square and 6 in. long. The test piece is placed on two knife-edge

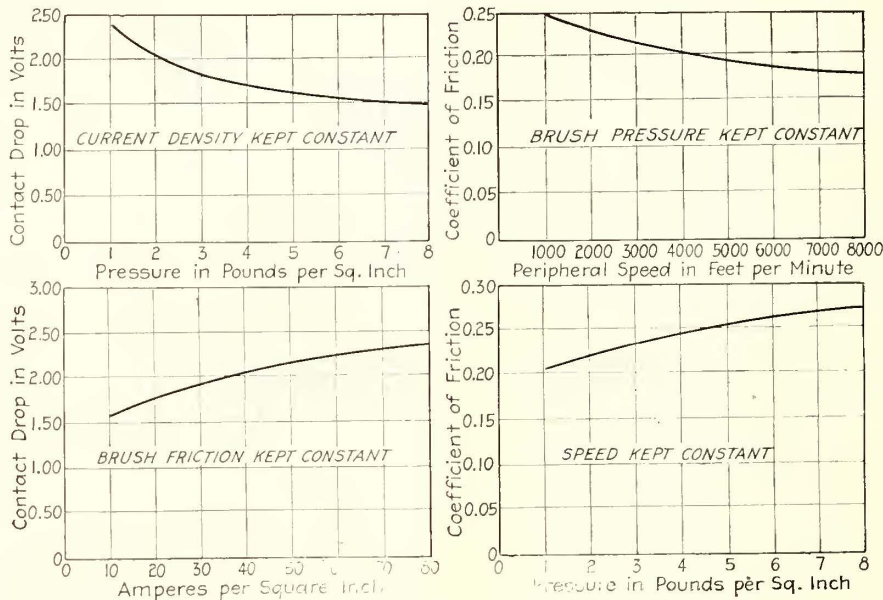
supports, 4 in. apart, and the load is gradually applied at the center until the piece breaks. The strength is computed in pounds per square inch by means of the following formula:

$$S = \frac{WcL}{4I}$$

where S = strength in pounds per square inch, W = load in pounds, c = one-half the thickness of the test piece, L = distance between supports, I = moment of inertia, $\frac{1}{192}$ in this case.

Typical test results vary over a considerable range from 1,000 to 8,000 lb., depending upon the material entering into the mixture as well as the method of manufacture. The strength of a good grade of electrographite brush suitable for railway work should be about 5,500 lb. per square inch.

Abrasiveness—Resistance to abrasion or scouring action of the carbon brush is the ability to withstand the wear due to friction. This term should not be con-



DIAGRAMS SHOWING EFFECT OF BRUSH PRESSURE ON CONTACT DROP, EFFECT OF PERIPHERAL SPEED ON COEFFICIENT OF FRICTION, EFFECT OF CURRENT DENSITY ON CONTACT DROP AND EFFECT OF BRUSH PRESSURE ON COEFFICIENT OF FRICTION

fused with hardness. Hardness relates to compactness of the mass as a whole, while abrasiveness relates to the cutting action of the brush due to the presence of gritty particles in the brush mixture.

There are no reliable tests for abrasiveness. Efforts have been made to develop an apparatus to test this characteristic, but these have failed to produce results that check with actual experience with the different grades of carbons under service conditions. This is attributed to the influence of the commutating currents on disintegration at the brush face, which cannot be reproduced on the testing machine. Brushes which show decided abrasive characteristics in operation will sometimes glaze over on the test machine and run for a long period of time without wear.

The abrasiveness of a brush depends on the composition and the amount of the ash which forms a part of the brush. It can be controlled by varying the mixture that enters into the various grades of brushes. Silica, mica and carborundum form the larger part of the abrasive material found in the ash of carbon brushes. The best modern practice among railway operators is to keep the mica of all commutators undercut, hence an abrasive brush is not required; in fact, it is objectionable, as it tends to wear the copper more rapidly. In this connection, it might be added that in the case of a motor which commutates poorly an abrasive brush may be required to keep the commutator surface well polished. A good grade of electro-graphitic brush suitable for railway work should be non-abrasive.

Density—The density of a brush is the quality or state of having the constituent parts massed or crowded together. The real density of a brush is the weight of the carbon, exclusive of pores compared to the weight of an equal volume of water, while the apparent density is the weight of the carbon with the pores compared to the weight of an equal volume of water.

The equipment necessary for determining density is a micrometer reading to 0.001 mm. and of a size adaptable to the test specimen and an analytical balance weighing to 0.0001 of a gram. For the test specimen $2\frac{1}{2}$ in. x $\frac{1}{2}$ in. x $\frac{1}{8}$ in. is a convenient size.

The test specimen is carefully measured for length, width and thickness and the volume is computed in cubic centimeters. This piece is then weighed and the apparent density computed by comparing it to the weight of an equal volume of water. The real density requires a more elaborate test as it is necessary to take into account the porosity of the material. To do this a sample of known volume is saturated with a liquid of known density and the weight of the saturated piece is determined, the apparent density of the sample having been previously calculated. It is then possible to make a correction for the liquid used to saturate the sample and to determine the real density of the test carbon exclusive of the pores by comparing this correct weight to the weight of an equal volume of water.

As the average real density of carbon brushes is 2, the apparent density will vary below this value, depending on the porosity of the finished carbon, which is determined by the material of the mixture and the process of manufacture. The apparent density of a good grade of electro-graphitic brush suitable for railway work should be approximately 1.5.

Thermal Conductivity—The thermal conductivity of a carbon brush is the property of receiving and transmitting heat through its homogeneous mass from particle to particle and from one body to another when in

contact. There has been no practical laboratory method developed for testing this characteristic of carbon brushes. This property depends upon the material in the brush as well as the method of manufacture. There is no practical unit of measurement of this characteristic. Graphite has a higher thermal conductivity than most forms of carbon. A good grade of electro-graphitic brush suitable for railway work should have the maximum thermal conductivity allowable.

Checking Dimensions—A caliper rule is used to check the length and width of brushes and a special gage to check the thickness. The type of gage shown in an accompanying illustration has proven very satisfactory, inasmuch as it can be adjusted when worn. When the plates forming the side of the gage become worn it is only necessary to dismantle the gage and regrind these plates to a true surface. When it is again assembled the gage will be restored to its original accuracy.

The finished carbons are checked for length and width, using the caliper rule, and then they must pass through the slot in the gage marked "go in" and not enter slot marked "not go in."

Of the three dimensions of a carbon brush the accuracy of the thickness is most important as it is essential that brushes have a snug fit in the carbon box to allow easy movement and at the same time prevent chattering. For unplated carbons, such as used in railway work, brushes should come within the following "tolerances": Thickness, 0.001* in. over to 0.003* in. under; width, nothing* over to 0.016† in. under; length, $\frac{3}{8}$ in. over to $\frac{3}{8}$ in. under.

The above allowances are in accordance with the specification as adopted by the Power Club and tentatively adopted by the A. E. R. A. committee on standards.

In the preparation of this article the writer has been indebted to H. A. Humiston of the National Carbon Company and W. C. Kalb of the Corliss Carbon Company for very valuable suggestions and assistance.

Hand Filing of Rail Joints Facilitated

THE United Railroads of San Francisco has facilitated the work of filing down rail joints by hand, presumably on isolated small jobs where the amount of metal to be removed is small, by providing a handle for the large files used. This handle consists simply of a piece of iron rod bent into U-shape, with a hole at one end, into which the tail of the file is inserted, and a



HAND FILE EQUIPPED WITH DETACHABLE HANDLE FOR USE ON RAIL JOINTS

clamp at the other end which fits over the file and is tightened by means of a thumbscrew. The handle can be removed in an instant by simply loosening the thumbscrew. Its use permits the workman to file longitudinally along the head of the rail as well as across it.

*Each brush shall pass by its own weight through a gage of these dimensions.

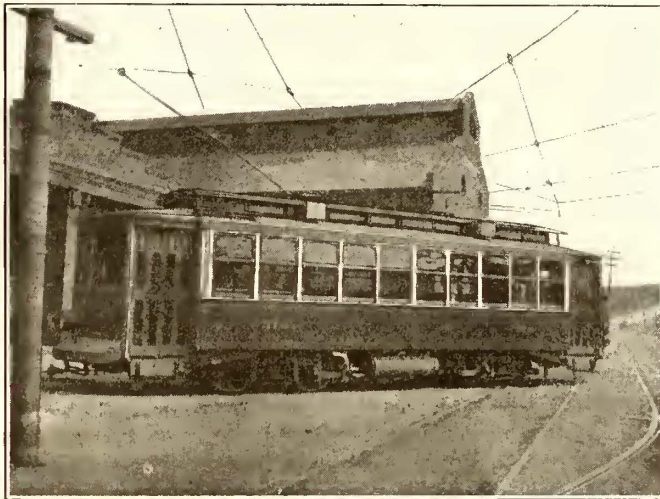
†The brush shall not enter a gage of these dimensions.

Rebuilding Old Rolling Stock

Scranton Railway Bringing Fifteen Old Cars Up to Date by Installing Modern Equipment for City Service

THE Scranton (Pa.) Railway is rebuilding fifteen of its older type of closed cars. This work was started some time ago and at present the reconstruction of twelve cars has been completed. The old cars, one of which is shown in accompanying illustrations, had full longitudinal seats and sloping sides, stationary sash and bulkheads.

The first steps in the reconstruction were to remove all sash, seats and control equipment, take off the sheathing and take out the bulkheads. The posts were spliced, new side sills added and $\frac{1}{2}$ -in. steel sheathing applied. The new sash have the upper half stationary and the lower half raises. New pantasote curtains were



A DIFFERENT LOOKING CAR AFTER GOING THROUGH THE SHOP

installed. The new seating arrangement includes twelve Hale & Kilburn transverse seats, while the end seats, built in the shop, are longitudinal. New floors have also been laid.

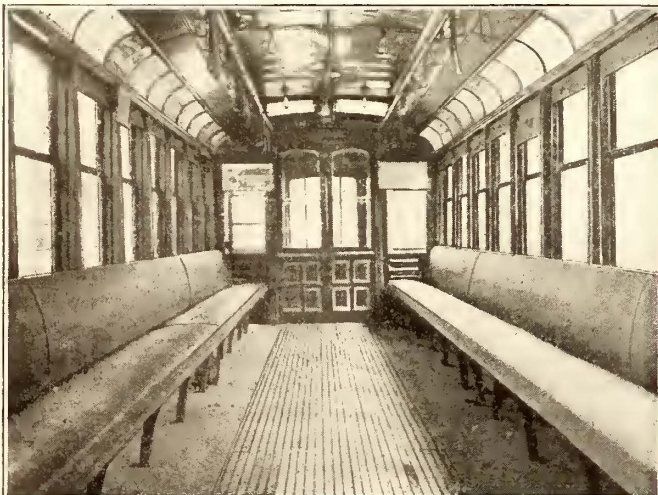
Four ventilators have been installed in the monitor roof of each car. Some of these are the Utility Honeycomb, while others are Garland type E. Keystone signs have been installed, also the Consolidated buzzer system

and twelve cross-seat, four panel and two vestibule Consolidated heaters. The Consolidated door signal system is also used. Other new equipment includes National pneumatic air-operated doors and steps, Golden Glow headlights and Economy meters. The cars are equipped with General Electric No. 70 motors. The new lighting arrangement includes four five-light series of 23-volt lamps, two rows of five down the ceiling of the car, one light outside over each door and one on each platform.

Flashing of Railway Motors Caused by Light Loads

ASOUTHERN railway company bought three second-hand cars equipped with four motors of the non-commutating pole type, which gave considerable trouble due to the motors flashing. Upon investigation it was found that the original owners operated these cars on a belt line where they ran in one direction only and the brushes on these motors had been given a back lead for this single-end operation. However, after the brush holder rigging had been changed and the location of the brushes had been adjusted to the neutral position for double-end operation it was noted that when the cars reached a certain speed the motors would tend to flash over and give some trouble. By accident it was learned that by cutting out one motor on the car—it made no difference which one—and operating with the other three motors, under no condition could they produce a flashover. This condition existed on all three cars and was a mystery for some time to all those in charge of the equipments. Many special tests and investigations were made none of which led to any definite remedies, until the phenomenon was finally explained as follows:

Under the most favorable conditions the motors concerned were fundamentally very sensitive to flashing and very much more so on light loads and the consequent higher speeds that occur when the motors were taking a small amount of current. For this reason flashing resulted when the critical speed was reached. With one motor cut out, the other three motors were obliged to do the work of four, and the load per motor was increased; also there was a corresponding reduction in the speed at which the motor operated to a value below the critical point, so that the motors then operated satisfactorily without flashing.



AT LEFT, INTERIOR OF CAR BEFORE REBUILDING. AT RIGHT, MODERN INTERIOR OF CAR AFTER REBUILDING

Why Use Fuel Oil in Power Plants?

The Advantages Claimed for Fuel Oil Are Set Forth and the Changes Necessary in the Furnaces for Burning Crude Oil Are Described

WITH the present coal shortage the manager of the railway utility generating its own power naturally wishes to know the possibilities of using crude oil.

The advantages claimed for oil burning under stationary boilers may be listed as follows:

1. Oil fuel is cheaper than coal in most parts of the United States.
2. Boiler room labor can be decreased.
3. Ash handling expense is eliminated.
4. Fires need not be banked and each fire is working at high efficiency.
5. Although both oil and coal may be purchased upon a B.t.u. basis, the tests involved in checking oil values are more easily and cheaply applied by the smaller companies.
6. Oil fuel can be burned more efficiently than coal.
7. Boiler rooms and surroundings can be kept neat and clean.

OTHER CLAIMS AS TO FUEL OIL

It is claimed further by those interested in promulgating the use of oil in boiler plants that one fireman can take care of ten oil-fired boilers, so that in large plants the decrease in labor required would be considerable. The cost of unloading coal, usually greater than that for oil, and the handling of ashes are eliminated. In the case of banked fires coal is being burned wastefully, whereas with oil-burning apparatus as soon as the load begins to decrease burners can be shut down or cut off entirely in any desired boiler or boilers and only enough fuel burned to maintain the load. By opening the proper valves at the burner more heat can be quickly obtained when needed. Longitudinal walls, placed in the fire box, confine the desired air supply to each burner, so that all those in use are operated at maximum efficiency. This is particularly important for boilers used on "stand-by" service. However, it is best to equip a boiler so that under ordinary conditions, with its changing load, all the burners may be operated with a corresponding intensity of fire, rather than to shut off entirely any number of burners when the load is reduced.

Assuming that fuel oil with 18,500 B.t.u. per pound is available in competition with a high grade coal testing 14,500 B.t.u. per pound, that the efficiency of the coal furnace is considered to be 60 per cent and that of the oil furnace 70 per cent, the theoretical equivalent for each long ton of coal would be 4.5 barrels of oil. Higher oil efficiencies than that assumed are, however, quoted which, if attainable in the average plant, would materially reduce the relation indicated. Managers in different sections of the country may readily determine cost comparisons for fuel if their boiler efficiency is known.

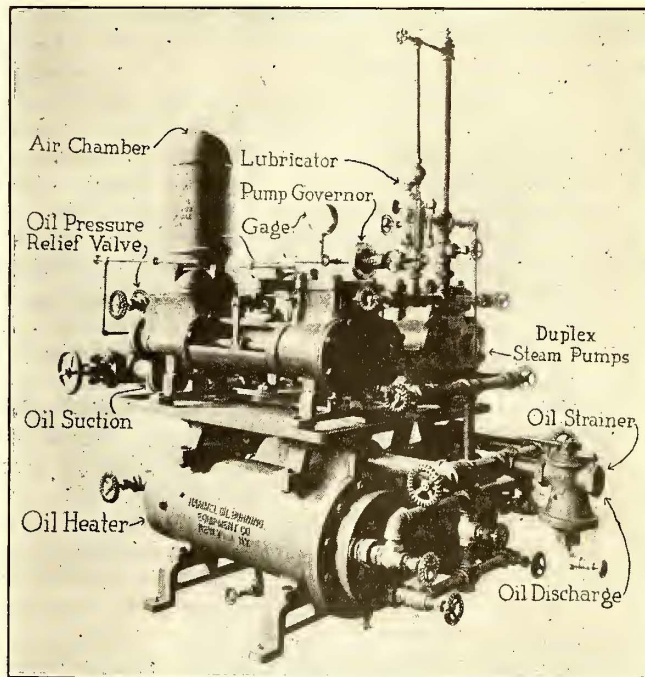
Among the manufacturers of apparatus for burning fuel oil is the Hammel Oil Burning Equipment Company, Providence, R. I. To the engineers of this company the *ELECTRIC RAILWAY JOURNAL* is indebted for technical information regarding the problems which are met in their work, the ways in which these have been met, etc. The accompanying halftone shows details of

an oil-burning equipment as manufactured by this company and much of the following information relates to the application of this equipment.

NEW EQUIPMENT REQUIRED

Application of an oil-burning system to any station requires a storage tank for the fuel oil, a pumping unit for drawing the oil by suction from the storage tank and forcing it under pressure to the burners, a general piping system for the necessary oil and steam pipes and the furnace changes whereby the coal-burning furnaces can be transformed for the use of oil.

The storage tank may be either of steel or concrete, depending upon local conditions. The usual practice is to make the storage large enough for at least a two weeks' supply of fuel if the plant is located near an abundant source. From the relation of oil to coal necessary it is possible to determine the oil supply required. The reservoir should be as near the boiler room as possible to obtain the shortest pipe lines, although this location must necessarily conform to insurance and local

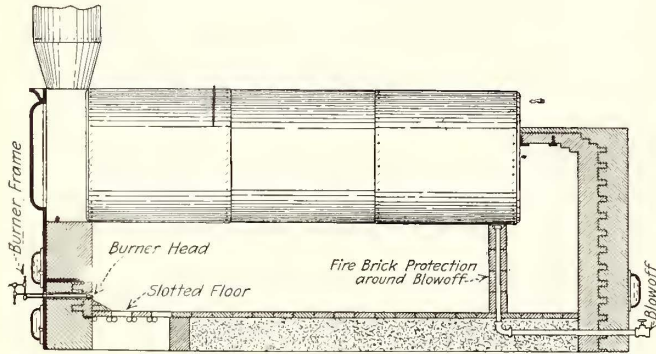


COMBINED PUMPING AND HEATING UNIT FOR OIL SUPPLY

fire regulations. Usually the reservoir is placed below ground, and adjacent to a railroad siding if oil is to be received in tank cars. Mexican oil, which is used very largely in the East, is extremely sluggish when cold, so that the tank cars are equipped with a steam coil for heating the oil to a temperature high enough to permit it to flow freely. In order to serve the largest tank car, the filling pipe should be at least 6 in. in diameter. A larger diameter may be preferable if the slope to the reservoir is not great.

A steam-driven pump is installed with its suction

connected to the main reservoir in order to force the oil under pressure to the burners. The Hammel unit consists of two standard duplex type steam pumps, furnished in several sizes, depending upon boiler capacity, specially fitted for fuel oil and including one or two heaters for heating the oil to the desired temperature for the burners. Only one pump is required at any time, the second unit being for use as spare equipment. The unit is conveniently piped so that either one or both heat-



FURNACE CHANGES FOR RETURN TUBULAR BOILER

ers may be used with either or both pumps. It should be equipped with automatic governor to maintain constant pressure of the oil discharge, a pressure gage, automatic relief valve, suction and discharge thermometers, strainer, pump lubricator and air chamber for the purpose of eliminating pump pulsation.

Exhaust steam from the pumps is used to heat the oil in the heaters. No additional supply of live steam is necessary. The oil should reach the pump at a temperature between 80 deg. F. and 100 deg. F., and after passing through the heater should be between 140 deg. and 160 deg. F., the desired temperature for burning.

The pump suction line should of course be as short as possible and should be provided with a foot valve. A total lift of 18 ft. may be successfully used if the oil is kept at from 80 to 100 deg. F. and the suction line made as short as possible. The discharge line from the oil pump is generally dropped below the floor level and carried in a trench along the front of the boilers, with risers at the proper places for conducting the oil to the burners. A meter should be placed at a convenient position on the line between the pump and the first branch tee, if it is desired to meter the oil. The discharge line is carried beyond the burners and returned to the storage tank for the purpose of circulating the oil when cold and when the boilers are being fired after a period of shutdown. An additional meter is of course necessary in the return line.

Since the driest possible steam should be delivered to the burners, the steam line should have a gradual slope toward the boilers and discharge into a trap at its lowest point. Steam lines may also be required for heating coils in the storage reservoir and for connection to steam coils upon the tank cars.

The burner in most common use for high pressure work is of the steam atomizing type. This has separate inlets for receiving the oil and high pressure steam. The oil is forced to the burner under a pump pressure, while the steam is generally under full boiler pressure at the burner throttling valve. The action of the steam inside the burner, and as it expands out of the burner into the combustion chamber, is to atomize the oil thoroughly into minute particles. When these

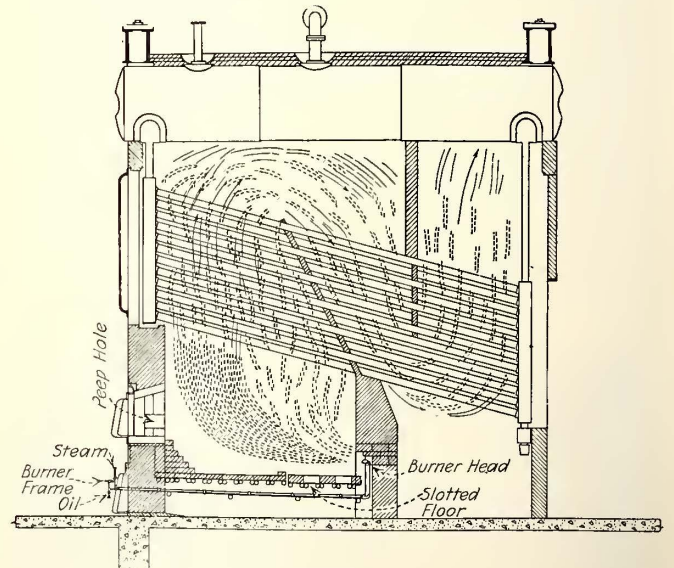
particles are ignited a fan-shaped flame is produced which extends from the burner mouth over the full width of the combustion chamber.

FURNACE CHANGES NECESSARY

In order to change the furnace for the use of oil fuel, the grates are removed and the bridge wall torn down to approximately the level of the top of the ashpit door. A new floor of fire brick is then laid upon pipe supports. Slots between the bricks are left for admitting the necessary air for combustion, the air entering through the ashpit doors. The rear portion of the floor is laid upon an earth fill. All the walls of the furnace above the level of the new floor should be lined with firebrick. As an oil fire develops a more intense heat than coal, it is advisable to use the very best grade of firebrick, with a fusing point at least 3,000 deg. F. These should be laid with a very thin fire-clay joint, the brick being rubbed into place without the use of a trowel. In order to avoid burning the blow-off pipe, it should be encased in fire brick or wrapped with asbestos.

In the usual setting the new bridge wall is placed as far in the rear of the boiler as possible, but in the Babcock & Wilcox boiler the area of the second gas pass should not be decreased an abnormal amount. To insure good combustion there should be a distance of from 8 to 10 ft. between the front wall and bridge wall. Within certain limits, the higher the boiler setting, the better the efficiency, especially at high overloads.

The burners for return tubular boilers are located in a small hole cut as low as possible in the cast-iron front of the boiler without interfering with the free passage of air through the ashpit door. In the Babcock & Wilcox, Stirling and Aultman & Taylor boilers the burner heads are located in notches in the bridge wall, the latter protecting them from the intense heat of the furnace.



APPLICATION OF OIL BURNERS TO WATER-TUBE BOILER

The number of burners for each boiler depends upon the width of the latter, the boiler design and local conditions. Average practice provides from one to four burners per boiler, *i.e.*, approximately six tubes, or a width of from 46 to 53 in. per burner. The whole burner frame can be easily and quickly detached by breaking two unions, when it is necessary to clean the burner. Then, by turning the frame sideways, both burner and frame can be slipped out of the ashpit door.

Electric Locomotives in Two Wrecks

Man Failure and Act of Providence Are Causes of Two Accidents on C., M. & St. P. Mountain Division—Electrical Equipment in No Way at Fault

ELECTRIC locomotives featured in two serious accidents which occurred in the spring in the Pacific Coast section of the Chicago, Milwaukee & St. Paul Railroad. All of the evidence has been taken and it is now possible to look back calmly upon the two accidents and to cite the circumstances on which B. B. Greer, vice-president, based his statement that one of the accidents was purely a case of man failure, while the other was the result of an act of providence, and in neither case was the electrical equipment or electrical operation of the road in any sense responsible.

One of these accidents is intensely interesting and informative as to the difficulties of mountain railroading. At 4:20 a.m. on June 16 train No. 74, with helper electric locomotive No. 10,239 on the front and a Mallet road engine on the rear end and fifty-eight loaded freight cars and one water car in the train, left Boylston, Wash., after the usual inspection of brakes.* A short distance east from this point the train began its descent of the long 2.2 per cent grade known as Beverly Hill

The engineer, who was an experienced man, allowed his train to gather momentum up to a point where regenerative braking in parallel could be cut in. The permissible speed for cutting in the motors for regenerative braking is from 15 to 20 m.p.h. Apparently this engineer waited for the speed to exceed 15 m.p.h., but failed to cut in his regenerative switches until the speed had reached at least 20 m.p.h., and the breakers would not hold. The confusion in his mind resulting from the operation of the overload relays caused a loss of action on his part for perhaps a fatal half minute, during which time the speed of the train kept rapidly increasing. The engineer then made a service application of his automatic air brakes, but this did not check the train. He tried to cut in the regenerative system a time or two, but the speed was too

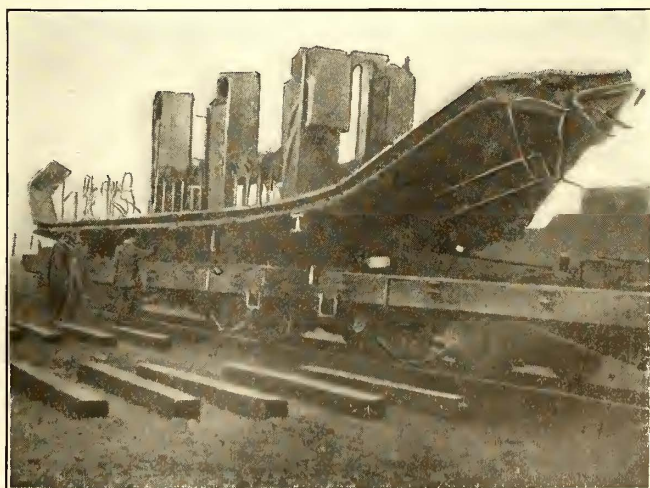
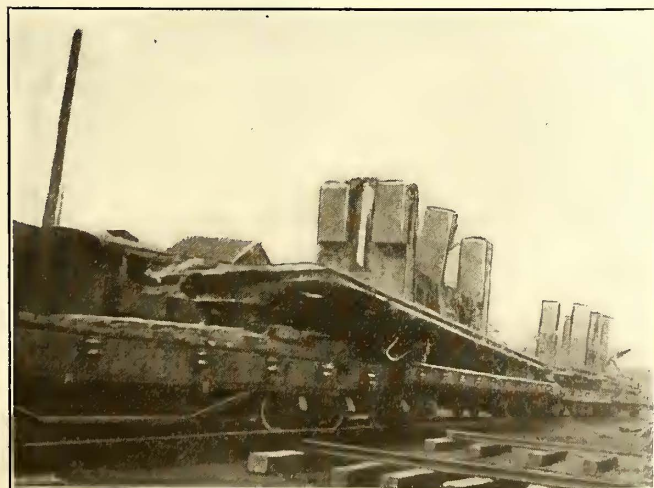
high and the breakers would not stay in. The service application of air was then released and an emergency application made, but the speed must have reached 35 m.p.h. by this time and the brakes had no effect in checking the train.

Running away, the train proceeded down the grade for a distance of 12 miles at a speed which is estimated was not in excess of 35 m.p.h., since it was held back to a certain extent by the independent driver and tank brakes on the Mallet engine on the rear, the retainers and the thirty-five hand brakes set up by the train crew. The train remained intact from the top of the hill to a switch at Doris, 12 miles, where the Mallet engine broke off the train on account of the tank becoming derailed. Presently this engine also left the rails, but was only slightly damaged.

Released from the holding power of the rear locomotive, the train gathered speed rapidly, and a little farther on twenty-eight cars of lumber and shingles piled up in a short space and were all consumed by fire. The remainder of the train proceeded eastward about 2½ miles, when thirteen more cars were derailed. Of these cars seven, carrying lumber and shingles, were badly damaged, but six cars carrying oil were practically unhurt. The remaining seventeen cars attached to the electric locomotive ran 1,000 ft. east of this point, where they were badly derailed in a short space and burned.

The electric locomotive, completely released from the train, proceeded 7 miles farther to a point 3 miles east of Beverly and stopped. The speed tape in this motor indicated that it ran at a maximum of 50 m.p.h. at some point, presumably after the Mallet broke off. There are several 10-deg. curves on this steep grade, and even with the excessive speed of the motor it did not leave the tracks nor did it cause any damage to the track. The total damage to the electric locomotive consisted of one motor-generator winding badly burned, one set of tires badly flattened and some minor damage to electrical connections. The entire damage, however, was slight.

*A map and profile of this section of the railroad will be found in the issues of this paper for Nov. 3, 1917, pages 819 and 820; Nov. 1, 1919, page 830; March 6, 1920, page 481.



PARTS OF WRECKED MILWAUKEE LOCOMOTIVES AS RETURNED TO THE WEST TACOMA SHOPS
These underframes are being straightened and the rehabilitated locomotives will soon be in regular service.

The first recorded indication of trouble was when the breakers at the Kittitas substation blew out, indicating the operation of the overload relays on a locomotive on the line. This occurred at 4:26 o'clock and records the time when the engineer first cut in his regenerative braking. At 4:45 o'clock the trolley line and feeder line at Doris substation went out, and at 4:48 the high-tension line went out on account of being broken with the derailment of the first lot of cars.

So far as the braking power of the train is concerned, the company has always considered the regenerative system as entirely supplementary to the air brake system and has drilled its engineers to place primary dependence on the air brakes. In this particular case, the tonnage of the train was 2,480, while the air brakes would hold 4,000 tons on this grade, providing the speed is kept below 15 m.p.h. The regenerative features in addition should hold 1,500 tons. This points to the fact that there was no question of braking capacity involved in this wreck. The fact that 15 m.p.h. was the maximum speed of freight trains permitted before electrification, while this is the minimum speed at which the regenerative features may be placed in operation, makes the opportunity for man failure particularly critical. The men are instructed to test the holding power of their brakes before attempting to cut in the regenerative system, but there is a possibility that this may not have been done on this particular train owing to the general desire to take advantage of the regenerative features for saving energy at the earliest possible moment upon descending a grade. Full examination has determined that the electrical condition of both the locomotive and the substations was absolutely normal and that each part of the equipment was functioning normally. The entire responsibility is placed upon the engineer, who failed to cut in his regenerative braking until the speed had become excessive.

BIG SLIDE WRECKS TWO LOCOMOTIVES

The other accident referred to occurred at 11:30 a.m. on Sunday, May 23, at a point 3 miles east of Ragnar, Wash. In this case two electric locomotives running light, with only a caboose attached, were just in time to reap the full result of an enormous slide on the side of a mountain which took away a considerable section of track.

A watchman patrolling the track happened to be in this vicinity at the time the slide occurred. He heard a rumbling noise and saw the slide start and could see that the track was going to be carried away. He knew that a passenger train was due there in a little while, and he hurried up the track to flag this train, not knowing about the two electric locomotives which were proceeding from the opposite direction.

These locomotives, Nos. 10,208 and 10,240, rounded a curve at 15 or 16 miles per hour and entered the sunken track, rolling and sliding down the slope to a point about 400 ft. below. The two engineers and two firemen carried down with them were practically uninjured. An instructor and brakeman had to be taken to a hospital, but they recovered. The cabs of both locomotives were almost completely wrecked. The underframes were badly bent and twisted and the sheeting on the sides and roof was stove in by hitting against rocks and trees as the engines slid down the embankment so that it was practically beyond reclamation. Inside the cabs the motor-generator sets, rheostats, control equipment, air compressors, wiring, etc., were practically all torn

from their fastenings and damaged more or less. The engine trucks, short and long main trucks, driving wheels and motors of both locomotives were very little damaged. The brake rigging on one engine was little damaged, while that on the other was damaged to some extent.

With the two wrecked locomotives some 400 ft. below grade, it was some problem to salvage them. This work was finally accomplished by loading the engines by pieces on wagons and carting them to North Bend on the Everett line, a distance of 7 miles, where they were loaded on cars and sent to the Tacoma shop.

Chicago Employees Support Commission

IN ITS current issue (Aug. 14), the *Union Leader*, official organ for Chicago of the Amalgamated Association of Street and Electric Railway Employees, has a strong editorial commendatory of the Illinois Public Utilities Commission.

Emphasizing the difficulty of the problem of the utilities with rising costs and fixed rates, the editorial says the commission members have attacked it fearlessly, honestly and in a practical way. These men of technical training and high ability, the "least understood, hardest worked and most abused" of all persons serving the Illinois public, are honorable men, and because they have done their duty have been "unreasonably criticised and abused by newspapers and politicians" who selfishly play the political game rather than work for the public welfare. The editorial concludes as follows:

We hold no brief for this commission, but have had occasion to observe its work and realize some of the difficulties it has labored under. We know that by using good judgment the members of the commission have saved the people of various communities in Illinois much inconvenience. For the valuable service they have given they are entitled to credit and a deeper appreciation by the press and people of this state.

Materials Handling Association

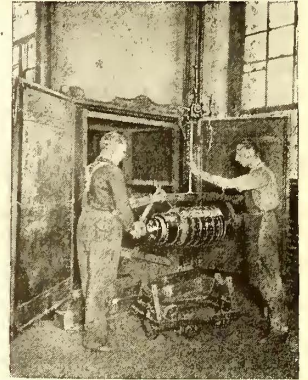
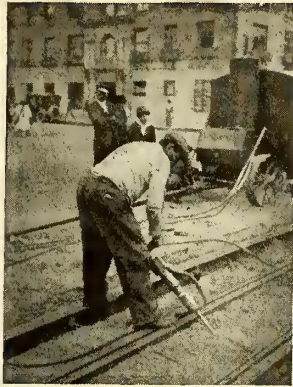
THE American Society of Mechanical Engineers has authorized the formation of a Materials Handling Section, the first and organizing meeting of which was held on Friday, Aug. 13, at the Engineering Societies' Building, New York.

It was indicated in this meeting that the work of this section of the American Society would be to study principles of the handling of materials, including the general problem of transportation, not of any particular transportation agency, but from the standpoint of linking up the transportation agencies so that material could be handled through in such a manner as to keep to a minimum the total cost of handling the material. Naturally, a large part of the work of this section will have to do with the handling of materials in manufacturing establishments.

In the article in last week's issue on "Training Platform Men" in Los Angeles, by J. G. Jeffrey, Director of Public Relations Los Angeles Railway, two titles were given to the author. That just mentioned with the Los Angeles Railway is correct. The title also given to him as an officer of the East St. Louis & Suburban Railway was due to a misplaced line, which was not caught by the proofreader.

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



Interurban Car Stop Signal

Semaphore with Signal Light Connection Operated by Waiting Passengers Substituted for Hand Signal System Commonly Used by Texas Railway

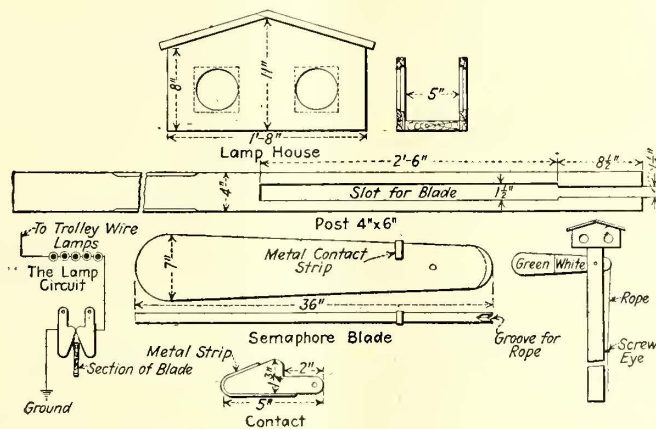
VERY few interurban railways have provided any special means for the convenience of passengers who wish to stop cars. In towns and cities and on lines where there are stations with ticket agents interurban cars make regular stops and this problem does not arise, but in country districts where stops are ordinarily not made between terminals, unless the cars are flagged, the usual method for stopping a car is for the passenger to wave his hand, hat or handkerchief as the car approaches in the daytime and to wave some sort of a light at night. As lanterns are not usually available, passengers resort to burning matches, pieces of paper or any other inflammable material which will produce a light. In windy or rainy weather the producing of such a light is quite a problem for the passenger, and it frequently happens that a car passes, leaving a dissatisfied customer and causes inconvenience, especially where the cars run at infrequent intervals.

In addition to this method being unsatisfactory, it is often quite dangerous, as was found by the Galveston-Houston Electric Railway, which lost a station at Dickinson by fire, started from a burning wisp of paper thrown hastily aside by a passenger as the car approached.

This experience led the railway company to install a type of semaphore and light signal, details of which are shown in the accompanying illustration. The essential parts of the device are a lamphouse and a semaphore blade, together with posts and contactors. The lamphouse is provided with green and white lenses on each side. Openings for these lenses are cut square half way through the sides and round the remainder of the way. This allows square pieces of glass to be used. Five lamps are installed inside the house connected in series to provide for the use of line voltage for lighting. The ends of the lamphouse are left open, so as to allow the heat from the lamps to escape.

The lamp sockets are installed against the roof bottom side up, so as to avoid any trouble that might result from rain. The lamps project downward from the socket. As shown in the sketch of the assembled signal, it will be seen that the lamphouse sets on top of the post. This post is slotted directly underneath the house to provide for the semaphore arm. The slot is made to fit the semaphore arm at the fulcrum, but below this point it is widened so as to provide clearance for the blade and prevent rubbing against the sides of the slot. The short end of the blade has a groove into which a rope fits for operating the signal. A contact device is provided just above the blade for closing the circuit and lighting the lamps. The contacts consist of two pivoted arms with metal strips around the lower end. These contact arms are held together by means of a spiral spring, which runs across from one to the other. The contact parts are $\frac{3}{8}$ in.

thick. A contact is also provided on the upper part of the semaphore arm in such a location that when the blade is raised by pulling the rope this metal contact will close the circuit between the two contact arms. A stop made of a small angle iron is placed at the bottom of the post under the blade. This prevents the blade from being raised above the horizontal position when the rope is pulled. Half of the blade is painted white and the other half green to correspond to the colors



DETAILS OF STOP SIGNAL

of the lenses used. Of course any colors can be used to suit conditions. On this road it has been found that where two bullseye lenses are used a coat of white paint applied to the surface of the white lens dims this light sufficiently so that the green light is more readily discernible.

At locations where there are station agents and where trains do not ordinarily stop except on signal the signals are arranged to be operated from the agent's station and an additional lamp compartment with red lenses is provided. This latter serves as a train order stop signal. An additional blade is provided which is painted red and has contacts for closing the circuit through the lamps in the house having the red lens. This blade is controlled only by the agent and dropped

from the top instead of being raised, as is done with the passenger's stop blade.

This type of signal has now been in operation for two years on our lines, has given marked satisfaction and has been enthusiastically received by the public.

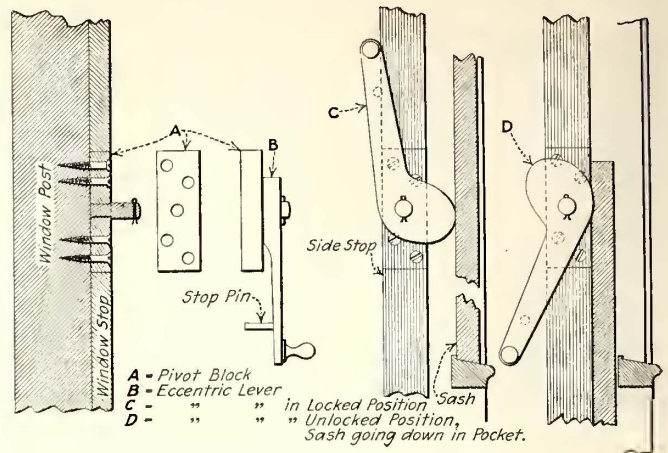
Kinks from the Des Moines Shops

Sketches Show How to Make Vestibule Window Latch, Holder for Turning Trolley Wheels and Skid for Broken Axles

BY C. R. MCMAHON

Master Mechanic Des Moines (Iowa) City Railway

THE center front vestibule window on many cars is a source of trouble and annoyance to trainmen in bad weather, as wind and rain often blow in around the edges. Any permanent fastening of this window which would make it tight is undesirable, since it must be

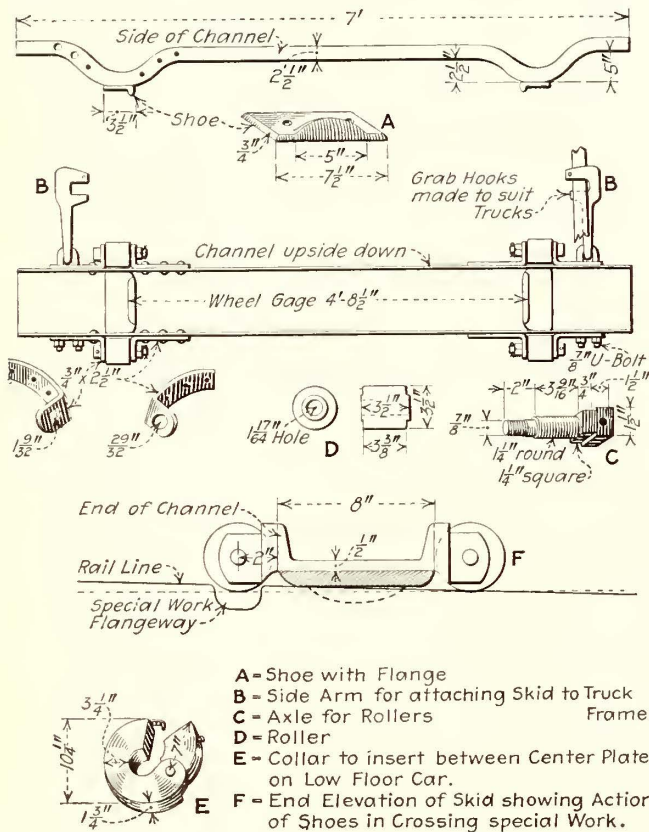


STORM LOCKS FOR MOTORMAN'S WINDOW

chuck which is made to fit the spindle of the lathe on which it is to be used. Four pins screwed into the face of this chuck project through the spokes of the wheel and prevent it from turning on the stud. The wheel is held in position against the face of the main chuck by a special washer and a knurled thumb nut which screws on the end of the stud. The turning tool used should be ground to the contour of a new wheel, making it a very simple matter to get a perfect job. After a wheel has been finished it is necessary only to loosen the knurled thumb nut, slip off the finished wheel, put another in its place and tighten up the thumb nut again.

A SKID FOR HANDLING BROKEN AXLES

The third sketch reproduced herewith shows a home-made skid for the purpose of bringing a car into the shop in case of a broken axle, locked wheels, etc. This skid may be operated successfully around curves and through switches, and, while it works better going ahead, a car can also be backed when the skid is in use. The device consists of an 8-in. channel supported by four 3½-in. rollers. The wheels of the broken axle are jacked up and the skid placed underneath them and attached to the truck frame by two side arms, the shape and length of which must be made suitable for the different types of trucks. A shoe mounted on the bottom of the channel between the rollers on either end is of such thickness that when the rollers are bearing on the rail this shoe clears the rail by ¼-in. In passing over special work, however, as the rollers drop into a flangeway, the shoe comes in contact with the rail, carrying the load and preventing the rollers from catching. These shoes also have a flange which keeps the

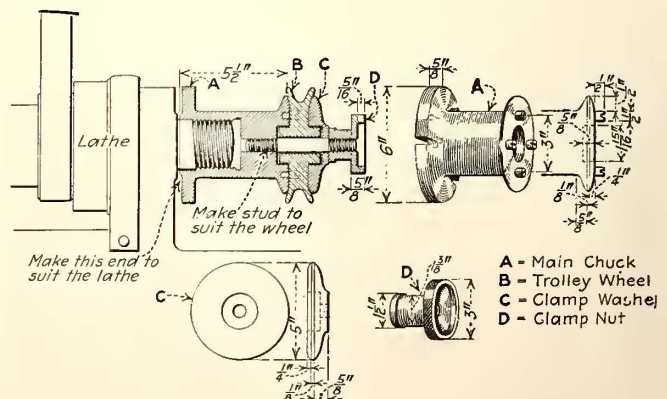


SKID FOR HANDLING CARS WITH BROKEN AXLES

arranged for ready lowering when it is necessary to throw a switch. Most of this trouble can be avoided by making use of home-made latches of the design shown in the accompanying sketch. One of these latches may be installed at the top of the sash or a latch on either side. The sash should be reinforced with a piece of brass or iron where the latch comes in contact with it. The accompanying sketch shows only the idea without dimensions. All parts should be made of the proper size and shape to fit the particular type of sash and car.

A HANDY SCHEME FOR TRUING TROLLEY WHEELS

Another sketch herewith shows a holder for truing up old trolley wheels. This device was made from a piece of old car axle and it serves the purpose very well. By using a stud of the right size to fit the wheel closely, bushing the wheel is made self-centering in the special



SELF-CENTERING HOLDER FOR TRUING OLD TROLLEY WHEELS

rollers on the track. When the skid is used with low-floor cars it is necessary to place an iron ring or hinged collar, as shown at *E*, between the body and truck center plates to prevent the motors from striking the car floor in going around curves. The axles for the rollers are made hollow and fitted with grease cups for lubrication.

The detail construction of the skid is quite completely shown in the accompanying sketch.

Train Order Desk Boxes

Galveston-Houston Electric Railway Has Replaced Train Order Machines by Home-Made Train Order Desk Boxes

WHEN the Galveston-Houston Electric Railway began operation all train order blanks for giving orders to trainmen by dispatches were printed in rolls. These rolls were placed in machines located in telephone booths and when an order was written two copies were run out of the machine by turning a crank, while a third copy was wound upon a roll that remained inside the machine. These machines gave considerable trouble and required considerable attention to keep them in

on top of the cover by two staples, which pass through slots in the tin and into the cover. Each order blank has a carbon back and the sheet of tin is used to furnish the hard surface necessary for copying. As many orders as are needed can be made, while with the previous type of machines it was possible to make but three.

The cover of the desk is provided with a slot into which one copy of the order is placed for filing. A space underneath is provided for the storage of extra blank pads. All boxes are equipped with duplicate locks, which make it convenient to remove the orders for filing as only one key is necessary. The conductors on express and baggage cars keep the desk boxes supplied with extra pads and so far no maintenance expense has been necessary.

The cost of constructing these desk boxes was \$3.60 each.

Association News

ATLANTIC CITY CONVENTION, OCT. 11 TO 15

Western Transportation Committee Appointed

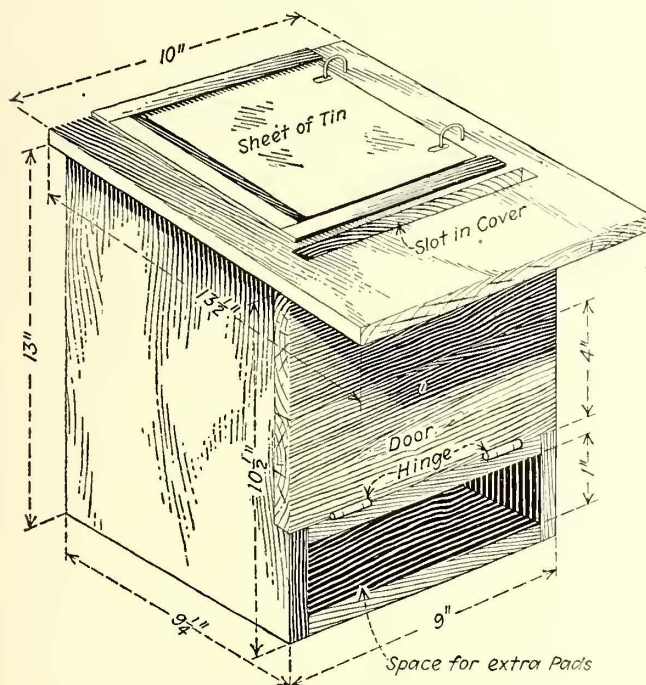
A COMMITTEE of men from the Middle West and West has been appointed to handle transportation arrangements for the Western territory, particularly with reference to the special train which will leave Chicago on Oct. 9. The personnel of the committee is as listed below:

- H. J. Kenfield, Chicago, Ill., general chairman.
Chicago: Williston Fish, Britton I. Budd, L. E. Gould, H. L. Monroe, C. W. Register, Frank Johnson, Harold Rudd, William Anderson, E. J. Magerstadt, R. R. Holden, Charles Knickerbocker, W. P. Butler, John Benham, Herbert Van Dorn, Arthur S. Merrill, William Simpson, M. A. Berg, E. H. Noyes, W. C. Burdick.
Illinois: A. D. Mackie, Springfield; H. E. Chubbuck, Peoria; J. R. Blackhall, Joliet.
Wisconsin: S. B. Way, Milwaukee; B. W. Arnold, Oshkosh.
Minnesota, North Dakota and South Dakota: Foster Hannaford, Minneapolis, Minn.; M. L. Hibbard, Fargo, N. D.; F. M. Mills, Sioux Falls, S. D.
Iowa, Nebraska and Kansas: B. J. Denman, Davenport, Iowa; R. A. Leussler, Omaha, Neb.; A. M. Patten, Topeka, Kan.
Montana, Idaho, Wyoming, Utah and Colorado: F. W. Hild, Denver, Colo.; J. R. Wharton, Butte, Mont.
Washington, Oregon and California: R. T. Sullivan, Tacoma, Wash.; Burton R. Stare, Seattle, Wash.; W. P. Strandborg, Portland, Ore.; J. A. Cranston, Portland, Ore.; G. J. Kuhrts, Los Angeles, Cal.; William Von Phul, San Francisco, Cal.; C. E. Heise, San Francisco, Cal.

Committee on Publicity Meets

THE American Association committee on publicity met at Association headquarters in New York on Monday, Aug. 16. Members of the committee present were B. G. Collier, chairman; C. B. Buchanan, W. A. Draper and C. D. Emmons; there were also in attendance J. H. Pardee, president; E. B. Burritt, secretary, and E. C. Faber.

Progress was made in deciding upon means and methods of accomplishing proper publicity, and plans for a specific working program discussed. Report was made of a meeting of the committee of publicity men held at the Association office last week.



TRAIN ORDER DESK BOX

good working order. The principal source of trouble was from the paper hanging up and becoming uneven while it was being run out.

In 1915 a hurricane passed through the section and every telephone booth along the line was upset and the order machines were wrecked in nearly every case. The cost of these machines was about \$20 each at that time, so that their replacement represented a considerable sum. To reduce this expense C. L. Greer of the company suggested a train order desk box as being more simple and easier to maintain. After experimenting with several different modifications, a desk of the type illustrated herewith was adopted and has been in use ever since.

This desk box is made of poplar $\frac{1}{2}$ in. thick and of dimensions as shown. A sheet of tin is loosely hinged

Coal Supply for Electric Railways

UNDER date of Aug. 17 the American Association addressed to the Interstate Commerce Commission two letters relative to coal supply. One urged the importance of the enlargement of Service Order No. 9 or of the issuing of an additional order to provide for the storage coal requirements of electric railways. Exhibits were attached to show that much inconvenience and suffering will arise in the communities served by the electric railways unless some such provision is made.

In the second letter information is asked on the following points:

First—Can an electric railway owning coal cars of its own ship them directly to a coal mine with which it has a contract for coal and then have them shipped directly by the coal company to the electric railway's power station? If so, will the electric railway be charged for freight both on the coal cars returned to it loaded and also on the coal cars by it sent back to the mines empty?

Second—If such a procedure is followed, will the railroad company or companies over whose road or roads the empty cars and loaded cars, respectively, travel be permitted to use the cars for any other purpose or to divert them to any other use?

Third—If such a course is followed, will the railroad be permitted to confiscate the coal either presumably, or in fact, for its own use? If so, what would be the measure of damage the electric railway would be entitled to from the railroad company?

Illustrations were given to show why the answers to these questions are important to the electric railways, and the letter concludes with the statement that many of the companies are willing to go to the expense of owning their own coal cars if by so doing they can make sure of a steady and dependable supply of coal at their power stations.

The first of these letters was signed by Secretary E. B. Burritt and Charles L. Henry, chairman committee on national relations. The second letter was signed by Mr. Henry.

Exhibit Space Going Well

GEORGE W. WELLS, director of exhibits for the Atlantic City convention, to be held Oct. 11 to 15 inclusive, reports the names of 109 concerns which have been assigned space to date. A number of these are new exhibitors. Already 80 per cent of the space used last year has been engaged. Machine tool manufacturers, who have hesitated about exhibiting at the American Association conventions in the past, will show an interesting collection of machines in operation this year. One of the important features will be the large group of welding exhibits.

A sub-committee, appointed to investigate shipping conditions, especially for the benefit of Western exhibitors, has interviewed the chief freight officials of the Pennsylvania Railroad, who will actively facilitate the movement of freight to Atlantic City. Special representatives of this road will be appointed in Chicago and Pittsburgh to this end.

Reasonable haulage rates have been secured from the Eldridge Express Company of Atlantic City, which will make the same charges as at the June exhibit of the Railway Supply Manufacturers' Association, as follows: Consignments weighing over 300 lb. round trip, per net ton, \$15; consignments weighing over 300 lb. one way, per net ton, \$7.50; consignments weighing less than 300 lb. round trip, per case, \$2.25; consignments weighing less than 300 lb. one way, per case, \$1.50.

Following are the concerns which have engaged space to date:

American Association of Manufacturers of Chilled Car Wheels.
 Ackley Brake and Supply Corporation.
 Air Reduction Sales Company.
 American Abrasive Metals Company.
 American Crucible Products Company.
 American Brake Shoe & Foundry Company.
 American Steel & Wire Company.
 Arthur Power-Saving Recorder Company.
 Albert & J. M. Anderson Manufacturing Company.
 Automatic Reclosing Circuit Breaker Company.
 American Car & Foundry Company.
 Bethlehem Steel Company.
 Bridgeport Brass Company.
 J. G. Brill Company.
 The Buda Company.
 Cheatham Electric Switching Devices Company.
 Chicago Pneumatic Tool Company.
 Chipman Chemical Engineering Company.
 Cleveland Fare Box Company.
 Barron G. Collier, Inc.
 Columbia Machine Works & Malleable Iron Company.
 Consolidated Car Fender Company.
 Consolidated Car-Heating Company.
 Curtain Supply Company.
 Cleveland Frog & Crossing Company.
 Dayton Mechanical Tie Company.
 Drew Electric & Mfg. Company.
 Dunbar Manufacturing Company.
 Electric Railway Improvement Company.
 O. M. Edwards Company, Inc.
 ELECTRIC RAILWAY JOURNAL.
 Electric Service Supplies Company.
 Elleon Company.
 Fire Gun Manufacturing Company, Inc.
 J. B. Ford Company.
 Gurney Ball Bearing Company.
 Galena Signal Oil Company.
 General Electric Company.
 Globe Ticket Company.
 Gold Car Heating & Lighting Company.
 Griffin Wheel Company.
 Gould Coupler Company.
 Hale & Kilburn Corporation.
 Heywood Brothers & Wakefield Company.
 Horrocks Desk Company.
 Hubbard & Company.
 Ingersoll-Rand Company.
 Indianapolis Switch & Frog Company.
 International Register Company.
 International Steel Tie Company.
 Irving Iron Works Company.
 Jennison-Wright Company.
 Kenfield-Davis Publishing Company.
 Lorain Steel Company.
 J. J. McCabe Lathe & Machinery Corporation.
 Metal & Thermit Corporation.
 Midvale Steel & Ordnance Company.
 Nachod Signal Company.
 National Brake Company, Inc.
 National Car Wheel Company.
 National Lock Washer Company.
 National Railway Appliance Company.
 National Pneumatic Company, Inc.
 National Tube Company.
 Niles-Bement-Pond Company.
 R. D. Nuttall Company.
 Ohio Brass Company.
 Ohmer Fare Register Company.
 Okonite Company.
 Oxweld-Acetylene Company.
 Pantasote Company.
 Peter Smith Heater Company.
 Perey Manufacturing Company, Inc.
 Pratt & Lambert, Inc.
 The Q & C Company.
 The Rail Joint Company.
 Railway Materials Company.
 Railway Track-work Company.
 Railway Utility Company.
 Rail Welding & Bonding Company.
 Reade Manufacturing Company.
 Rooke Automatic Register Company.
 Russell Manufacturing Company.
 St. Louis Car Company.
 Sattley Company.
 Schutte & Koerting Company.
 Sherwin-Williams Company.
 Simmons-Boardman Publishing Company.
 Standard Underground Cable Company.
 Star Brass Works.
 A. Stucki Company.
 Taylor Electric Truck Company.
 Thew Shovel Company.
 Templeton, Kenly & Company, Ltd.
 Texas Company.
 Transit Equipment Company.
 Thayer & Company, Inc.
 Trolley Supply Company.
 Tubular Woven Fabric Company.
 United States Graphite Company.
 Universal Lubricating Company.
 Van Dorn Coupler Company.
 Western Electric Company.
 Westinghouse Electric & Manufacturing Company.
 William Wharton Jr. & Company.
 Wheel Truing Brake Shoe Company.
 Wilson-Imperial Company.
 Wilson Welder & Metals Company.
 Alan Wood Iron & Steel Company.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Open Shop the Issue

Union Unable to Secure a Hearing from Court on B. R. T. Agreement—Walkout Threatened

Recognition by the company of the Amalgamated Association has come to the fore as the chief point at issue between Lindley M. Garrison, receiver for the Brooklyn (N. Y.) Rapid Transit Company, and the system's employees. Both Mr. Garrison and Federal Judge Julius M. Mayer have flatly refused to have any dealings with the association's representatives in the company's employ. The union leaders, for their part, have announced that unless their demands for a closed shop are met a complete tie-up of the B. R. T. lines will take place soon.

Prospects of a strike became more imminent on Aug. 16, when Judge Mayer refused to confer with union representatives on the question of the acceptance by the company of a new working agreement. The men intimated that they might walk out at any time after Aug. 28, when the present agreement will expire. Judge Mayer warned the union on Aug. 17 that under the terms of the agreement no strike could be called without thirty days' notice from the union.

WILL NOT TREAT WITH UNION

Mr. Garrison has announced his willingness to deal with the men as employees of the company. The receiver takes the stand that as the representative of the federal court he is not free to enter into an understanding with the union. In this course he is supported by Judge Mayer.

A letter setting forth his reasons for refusing to confer with the union officials was presented by Judge Mayer to the committee of the three presidents of the locals embracing a majority of the B. R. T. employees. In this letter Judge Mayer incorporated seven articles taken verbatim from the proposed agreement. They provide that all employees of the company eligible to membership shall be "sent by the company to join this association"; that employees in arrears of dues, fines or assessments shall be suspended, on the request of the officers of the association; that collectors for the association shall be permitted at all times to enter the property of the company, and that the company shall not enter into any agreement, verbal or written, with any newly formed labor or fraternal association. This clause was inserted for the evident purpose of shutting out of the company's employ members of the Brotherhood of Surface Employees of the Brooklyn Rapid Transit, an or-

ganization following the pattern of the Interborough Brotherhood, which the Amalgamated has been fighting for many months.

Other provisions contained in the proposed agreement are that any of the company's employees needed in the service of the association shall receive a leave of absence; that the association shall be permitted to distribute circulars and the like in any part of the company's property, and that no employee shall be discharged until after a hearing before a board composed of the officers of the company and of the association.

WOULD MEAN CLOSED SHOP

Concerning the extracts from the proposed agreement contained in his letter, Judge Mayer wrote:

Obviously the federal court cannot permit its receiver to agree to provisions of this character. Without going into further detail, it is definitely plain that the three proposed amendments in effect demand of the federal court that the receiver must operate a closed shop. * * *

If, as I assume from your letter, you desire to have a conference with me to ascertain my attitude in respect of a closed shop, I can only say that such a conference would not be of service, as the receiver has correctly stated my position. If, however, there are other matters which you wish to bring to my attention, I shall be pleased to consider any communication from you in respect thereof.

Pay Rise for Montreal Men

Reconsidering their action in threatening to strike unless their demands for higher pay were fully met, the employees of the Montreal (Que.) Tramways voted on Aug. 15 to accept the report of the board of conciliation granting them an increase in wages of from 25 to 30 per cent. Under the terms of the award the men will be paid at the rate of 45 cents, 50 cents and 55 cents an hour for first, second and third year men respectively. The wage increase will cost the company approximately \$800,000 annually.

The agreement is to be effective until June 30, 1921. The men will receive back pay from July 1 last.

The men originally demanded an increase in pay amounting to 75 per cent, an eight-hour day and time and one-half for overtime. The case was presented to a board of conciliation, which made public its award on Aug. 5. The men at first voted to reject the board's report and gave the company twenty-four hours in which to grant their full demands. This action by the men called forth a sharp answer from the Tramways management. For several days a strike appeared imminent. The union later decided to reconsider the matter, and the acceptance of the award followed.

Tacoma Wages Adjusted

Small Increase in Pay and Some Concessions in Working Conditions Included in New Agreement

The question of wages and working conditions in Tacoma, Wash., during the year beginning Aug. 1, 1920, has been settled by representatives of the Tacoma Railway & Power Company and the union entering into an agreement granting a small increase in wages and some advantages in working conditions. The increase was ratified by the men by vote with a majority of nearly six to one.

The union attempted to get a closed shop agreement, but failed. The agreement, however, provides for no discrimination against any employee on account of his membership in a union, as well as no discrimination among union men against those who may not wish to belong to the union. There is to be arbitration of matters which cannot be settled amicably by a meeting of representatives of the company and men.

Motormen and conductors for their first six months of service, are raised from 50 cents to 55 cents an hour. Men in the second class, from six months to eighteen months in the service, will receive 59 cents instead of 55 cents an hour. Men of service more than eighteen months will receive 63 instead of 60 cents an hour. Gripmen on cable cars get 5 cents an hour extra, as formerly, but one-man car operators will get 5 cents instead of 4 cents an hour extra. The additional pay for breaking in students is raised from 2½ cents to 5 cents.

SHOP WORKERS GET MORE

Shop employees get an increase of from 20 cents to 40 cents a day, except women inside carwashers, who are raised from \$3 to \$3.65 a day. When women wash the outside of cars, they are to get \$4.40, the same as men. Wages for men in the shops range from \$4.40 for unskilled to \$6.20 for skilled labor. In the track department, workers get a raise of 5 cents an hour, to 55 cents. Those on a monthly basis get a flat \$10 increase.

A concession to extra men guarantees them \$100 a month, as a minimum, against \$90 in the former arrangement. Employees in train service working on regular runs are guaranteed not less than eight hours pay for each day's work, except Sundays, and runs totaling 7½ hours or more are to be considered regular runs. Time and one-half applies to overtime work, computed after eight hours work. Eight hours constitutes the day. Operators of one-man cars get a concession of ten minutes straight time for the preparation of their daily reports.

Wages Increased in Cincinnati

Men There Awarded Increase of Nine Cents After Very Careful Study of Economic Conditions

Motormen and conductors in the employ of the Cincinnati (Ohio) Traction Company have been awarded an increase of 9 cents an hour in wages by the arbitration board on a contract which runs for a year from July 1, 1920. They had asked an advance of 40 cents an hour. Nine hours is to constitute a day for the rank and file of employees, but the nine-hour day does not apply to the trainmen. The average run on regular trips on the system is 9.3 hours and this remains. The finding and the opinion of the arbitrators are of unusual importance because of the very thorough effort that was made to dispose of the question in the light of the actual needs of the employees under the present conditions of inflated prices. There was absent any tendency to arrive at a conclusion by compromising between the demands of the men and some offer by the company, the chief underlying principle adopted being to get at the facts and make a decision on the merits of the case in Cincinnati.

THE arbitrators were George Dent Crabbs, president of the Philip Carey Manufacturing Company, a large local industrial plant producing asbestos products, who represented the company; James A. Wilson, president of the Pattern Makers' International Union, who represented the men, and Prof. Alonzo Tuttle, a teacher of law in the Ohio State University. The appointment of Professor Tuttle was made by the Industrial Commission of Ohio, pursuant to terms of the contract between the company and the men, as the arbitrators named by the company and the men were unable to agree upon the third arbitrator.

The award of the board follows:

Section 5 of the agreement to be changed to read as follows:

Section 5—The wage scale of motormen and conductors from midnight June 30, 1920, to midnight June 30, 1921, shall be as follows:

First three months, 54 cents an hour.
 Next nine months, 57 cents an hour.
 Thereafter, 59 cents an hour.
 Overtime for motormen and conductors shall be paid for at the rate of time and one-half time.

Crews of snow sweepers and salt cars shall be paid at the rate of time and one-half time for all time put in, including time spent in barns before taking out same.

Crews operating sand cars, pay cars, special cars, sprinkling cars, work cars, coal cars and supply cars, shall receive the regular rate of wage scale for conductors and motormen, nine hours to constitute a day's work. All platform work in all departments is to be performed by transportation men.

Electric shovel operators shall be paid 65 cents an hour, with time and one-half time for overtime, nine hours to constitute a day's work.

Barn men, members of the association, except car tenders and watchmen, shall be paid an advance of 18 per cent over the present rates. When this figure is less than one-half cent over the cent per hour, a half cent shall be added. When it figures over the half cent per hour, a cent shall be added. For illustration, if the advance is 8½ cents, it shall be 8½ cents; if it is 8 cents it shall be 9 cents.

The company reserves the right to determine the number and class of men to be placed at each barn, and these men shall not be discriminated against because of their being members of the association.

In case of vacancies that may arise men are to be promoted from a lower to a higher rate of pay or from a night to a day shift, provided, in the opinion of the company, they are capable of filling the position paying a higher rate or the more desirable position.

Nine hours shall constitute a day's work. Overtime shall be paid for at the rate of time and one-half time.

All men working day shifts shall complete their day's work by 6 p.m. each day.

Barn men shall perform such duties as shall be regularly assigned to them or do such other work as the company may prescribe when necessary to facilitate the work.

Car tenders shall be paid at the rate of 45 cents an hour, nine hours to constitute

a day's work, and time and one-half for overtime; and they may be promoted to fill vacancies in carhouses, provided, in the opinion of the company, they are capable of performing the higher class of work.

Watchmen shall be paid at the rate of 45 cents an hour, nine hours to constitute a day's work.

Incline gatemen, members of the association, shall be paid at the rate of 48 cents an hour, ten hours to constitute a day's work.

Curve cleaners shall be paid 45 cents an hour, nine hours to constitute a day's work. Overtime shall be paid for at the rate of time and one-half.

Section 20 to be amended to read as follows:

Section 20—All substitutes shall be guaranteed a minimum wage of \$100 a month, to be divided \$50 each pay day in the month, provided, however, that any man missing shall forfeit one day's proportion of said monthly guarantee for the day on which the miss shall occur, and any man absent on account of sickness, leave of absence or under suspension, shall lose one day's proportion of said monthly guarantee for each day of such absence or suspension. Men earning more than the guaranteed minimum of \$100 a month or \$50 per pay, shall receive in full the amount they earn.

The board recommends that all crane cars, work cars and dump cars be equipped with air brakes.

ASKED 80 PER CENT RISE

The men demanded an increase of 80 per cent over the old wages, double time for overtime and other conditions. The following table shows the old wages and conditions contrasted with the demands:

	Previous Scale (Per Hour)					Demands (Per Hour)				
	First 3 Mos.	Next 6 Mos.	Thereafter	Over-time	Work-Day	First 3 Mos.	Next 6 Mos.	Thereafter	Over-time	Work-Day
Conductors and motormen	.45	.48	.50	1½	9.1 hour	.85	.88	.90	double	9 hours
Sweepers	.675	.72	.75	...	.....	1.70	1.76	1.80	.....	.....
Salt car	.675	.72	.75	...	.....	1.70	1.76	1.80	.....	.....
Elec. shovel operators	.55	.....	.....	1½	10 hours	1.00	.....	.....	double	9 hours
Car tender	.37	.....	.....	1½	10 hours	.665	.....	.....	double	9 hours
Curve cleaner	.37	.....	.....	1½	10 hours	.665	.....	.....	double	9 hours
Watchman	.37	.....	.....	.....	10 hours	.665	.....	.....	.....	9 hours
Incline gateman	.40	.....	.....	.....	10 hours	.72	.....	.....	.....	10 hours
Barn men (general)	.425 to .58	.....	.....	1½	10 hours	.765 to \$1.04	.....	.....	double	9 hours
Substitutes (guaranteed pay)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Crane car	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Work train	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Professor Tuttle, chairman, in giving reasons for the award said:

The board in making the award was actuated by a desire to do justice to the three parties vitally concerned; namely, the men, the company and car riders of Cincinnati. Though prices entering into the cost of living in Cincinnati are, according to figures given us, about 12 per cent below the average city in the country, in respect to street-car service the cost in Cincinnati, as compared with most American cities is, and must be on account of its hills and extended service, unusually high. In considering, however, the rate of fare in Cincinnati, it must be remembered that there

are several cities in the United States where the fare is much higher. These facts, however, do not blind us to the further fact that Cincinnati is already paying a high rate of fare, and seems destined to pay a higher rate still. In considering, therefore, any increase in wage to employees the board was confronted with the fact that any large increase meant an additional burden on an already burdened body of our riders.

The company, as is known, operates under a service-at-cost plan—to our mind an eminently fair and sound system and greatly to the credit of Cincinnati. In spite, however, of the guarantee of \$416,000 to the company as a fair return to the stockholders, no dividends have been paid to these stockholders for the past five years, and as a result the stock has sold in the market at the low price of \$21 per share on a par value of \$100, with 23½ per cent unpaid accumulated dividends. While, therefore, the company may not seem to be concerned in this award under its service-at-cost franchise, it in reality is, for it is essential to the future financial prosperity that its return be such that it can finance its operation at other than ruinous rates, a thing apparently impossible. Could the company today borrow money to make needed improvements it could effect material economies in operation. It must be borne in mind also that there comes a time somewhere that increased rates do not produce corresponding increased revenues, because when fares get too high people will walk rather than ride wherever possible. There seems to be some slight evidence of this principle already working in Cincinnati. How much higher, if at all, the rate can go without this recession setting in cannot be said, though it is believed the limit is not far off.

The men, naturally, are vitally affected by this award. An increase of 40 cents an hour was asked, which, if granted, would have increased the cost of operation, according to figures by Mr. Culkins, street railway commissioner, over \$2,500,000. This would have caused a very marked increase in the cost of fare—probably, according to the same figures, about 2½ cents a ride, unless economies in other directions could have been practiced to offset this large increase in expense. The board did not feel that any such burden could be put upon the car riders in Cincinnati.

On the other hand the board felt that the car riders of Cincinnati should not and would not object to having the men paid enough to keep even with the increased cost of living. Already the community is paying 2½ cents more than the pre-war rate of 5 cents to meet the increased cost of coal, labor and other materials, and it was felt that it was only reasonable that the further increased cost of living of the men should be paid for.

Figures given by both sides agreed that the increased cost of living in Cincinnati since Nov. 1, 1918, is about 18.3 per cent. Starting, therefore, with the award at that date by the War Labor Board to the employees of a maximum rate of 48 cents, which award we are compelled to assume

was fair and just, and adding to that award the increased cost of living to July 1, 1920, of 18.3 per cent, we find that the present wage would be a little less than 57 cents an hour.

This would in itself seem to have been a sufficient increase, in view of the existing rate of fare in Cincinnati, were it not that the board was confronted with the further fact that since the War Labor Board has given its award in 1918 of 48 cents to Cincinnati, along with other cities, in many of these same cities a marked increase of wage has been allowed, as in Cleveland, where the wage is now 75 cents an hour. It is true there are many cities in the country where the wage is still

considerably lower than the wage awarded in Cincinnati. It is also true that in some of these cities where the wage has been greatly increased the cost of living is much higher than in Cincinnati, but the outstanding fact was that, whereas Cincinnati started in 1918 with the War Labor Board award of 48 cents, along with Cleveland and other cities, in Cincinnati there has been only a 2-cent increase since that time, while in many of those other cities the increase has been very much greater. This, to our mind, gave the men the right to expect something more than the mere increase to meet the increased cost of living.

In view of the fact, however, that many cities in the country as large as Cincinnati are paying considerably less than the amount here awarded, and also in view of the fact that the car riders in this city are already paying a high rate of fare, it did not seem to the board that at this time it was possible to give more than was given in the award above. It is further to be hoped that the company will introduce every possible economy consistent with good service to keep down operating costs, and in this way protect the car rider from mounting fares. It is believed by the board that, all things considered, the increase in the award given is manifestly fair to all parties concerned.

One of the features of the arbitration hearing was the absolute lack of public interest in the proceedings, although under the "service-at-cost" franchise held by the company the increase would pass to the car rider in the shape of an advance in fare. The rate has been 7½ cents (ticket) and 8 cents cash.

COMPANY SHOWS DEFICIT

It developed during the hearing that the company had a deficit in June, and that preliminary estimate indicated a deficit in July. This means that the fare will automatically advance to 8 cents on Sept. 1. Vice-president Walter A. Draper of the company stated that to meet the demands of the men in full would require 3½ cents additional fare, making the fare 11½ cents.

W. Kesley Schoepf, president of the company, declared in his letter to the union that the men's demands were out of all proportion, and that he would under no circumstances approve expenditures on the part of the company that would add to the burden that the car rider is already carrying. This attitude on the part of the company was in contrast to criticism made when the "service-at-cost" franchise was under consideration by the City Council and to the effect that a franchise which passed expenditures on to the car rider would throw the door open for the company to become careless and extravagant.

The arbitration hearing was completed on Aug. 10. In the final argument the attorney representing the company brought out the fact that in the present contract with the men it was provided that, in connection with employees of a certain kind, they shall be promoted, etc., "provided, in the opinion of the company, they are capable of filling the position—". The insertion of the three words "and the association," after the word "company," was asked. These three words, argued the company's attorney, practically transferred control of the men from the company to the union—a dangerous and unwholesome condition. He said:

If the labor situation had reached a point in this country where committees from the union would oversee the work of the men and recommend their promotion from one position to another conditions would be different. But as it is we contend that the company should have absolute veto power on promotion, and we most earnestly request that the arbitrators in this dispute will not put a change in the contract which will put the question of promotion into the hands of the men.

Both the company and the men submitted figures on the cost of living, and, by coincidence, it was shown that the increase since November, 1918, was approximately 18 per cent. The men, however, were continually pointing to Cleveland, where a higher wage prevails, and in the closing hours of the argument statistics were introduced to show the difference in the cost of living between Cincinnati and Cleveland. It required six and one-half days to submit and argue the case.

The company submitted data showing that 102 of the employees own automobiles. This is a ratio of approximately one auto to each fourteen employees, compared with one auto to each fifteen in the entire population of the city and county.

On the other hand, the men submitted a statement showing the result of a canvass made by them. The following figures are based on 1,511 replies received to the questionnaire:

Homes owned (unincumbered)....	108	}	423
Homes owned (mortgaged).....	315		
Married men.....			1,272
Average dependents.....			2.9
Single men.....			239

On the question of saving through economies in operation Vice-President Draper, of the company, stated that \$200,000 a year could be saved by faster schedules, and if the company were permitted to organize its service on the split-run basis a saving of approximately 1 cent per passenger could be achieved. The company was unable to speed up schedules because of traffic congestion and parking in the downtown section of the city.

The regular force of trainmen worked an average of 305 days during the past year. The actual earnings of these regular men, during the year, were:

No. Men	Range Yearly Wage
226	Earned under \$1,500
203	Earned from \$1,500 to \$1,600
249	Earned from \$1,600 to \$1,700
180	Earned from \$1,700 to \$1,800
83	Earned from \$1,800 to \$1,900
50	Earned from \$1,900 to \$2,000
27	Earned over \$2.00

(The maximum paid to one man was \$2,167.65)

According to Mr. Draper the maximum possible earning for a regular man, working every possible day on regular runs, and the fifteen extra runs (allowed by the union contract) of 1½ hours each, would be \$1,898 for the regular runs and \$467.29 for the "extras," or a total of \$2,366 a year.

The company has 1,176 regular motormen and conductors, and there are 1,302 regular runs.

The above earnings were made by the men on the scale of 45, 48 and 50 cents for platform service.

Des Moines Prospects Better

Means Appear to Have Been Found for Granting Company Fare Increase and Raising Wages

Movements looking toward the settlement of the railway problems of Des Moines, Ia., have developed with kaleidoscopic rapidity during the past week. As this article was written it appeared that a way had been found to grant at least a temporary 7-cent fare. This would permit better service and prevent a strike of the railway men called for Aug. 25, unless satisfactory arrangements between the Des Moines City Railway and its employees are made before that time.

THE first step was the appointment of a valuation board of three men by the City Council to value the property of the railway. The Council named Frank E. Lyman, chairman of the United Improvement Leagues, which had made a move toward a settlement; E. D. Perry, a Des Moines lawyer, and James King, of Toltz, Day & King, an engineering firm at St. Paul.

The appointment of this board, however, proved later to be a purely perfunctory action as the Council shortly afterward entered into a contract with Toltz, King & Day for the actual work of placing a valuation upon the railway plant. While the valuation board mentioned above has not been discharged the two Des Moines members are expecting to take only a nominal part in the work and leave the technical work all up to the engineering firm. Toltz, King & Day are to receive \$14,000 from the city for arriving at the valuation of the plant at the present time and \$2,000 for de-

termining a valuation as of 1915, when the new franchise was granted the railway.

Almost immediately upon the heels of the Council's action in hiring the engineers came a strike vote upon the part of the union of railway employees. The men are demanding payment for the difference between the rate granted them by the arbitration board and that which was allowed by Judge Martin J. Wade of the federal court. The arbitration board awarded the men a maximum of 70 cents an hour dating from March 1 this year, but Judge Wade held that the revenues of the company were not sufficient to meet this increase and ordered that the 60-cent rate be maintained.

The next development was the decision by Judge Ben. I. Salinger of the Iowa Supreme Court, in the Ottumwa Railway & Light case that as the Iowa Legislature has not sanctioned the fixing of a permanent fare, rates named in contracts between Iowa cities and their utilities can be changed. This

decision was immediately seized upon by all parties in the Des Moines controversy as the way toward a settlement.

INTERVENTION BEING SOUGHT

Petitions of intervention were then filed in the federal court, one by the railway union and one by Frank K. Mathis, a Des Moines property owner, looking toward relief of the city railway. At the time these petitions of intervention were filed the Des Moines City Railway petitioned the court for an increase in fare to 7 cents in order that it might meet the wage demands of the union.

Judge Wade set the hearings for Friday afternoon, but upon motion of the city attorneys ruled out the petition filed by Mr. Mathis. The city also resisted the petition by the employees, but Judge Wade held that as they were already before the court their petition would be made a part of the regular proceedings.

Special Counsel Byers, acting for the city, resisted the application of the ruling in the Ottumwa Railway & Light Company case to the Des Moines case as he claimed that Justice Salinger had made his ruling upon the basis that the Iowa Legislature and never expressly given to cities such as Ottumwa the right to make such contracts with city railways. Mr. Byers claimed that Des Moines is governed by commission plan law which expressly gives the city a right to enter into such contracts upon the approval of the voters.

IMMEDIATE INCREASE REFUSED

After hearing the case for the railway, the employees and the city Judge Wade gave practically an unqualified concurrence to the decision of Justice Salinger and suggested that the three parties to the case get together and try to work out a settlement. Then he tersely advised that unless they had arrived at an agreement before Aug. 20 he would take steps to end the controversy. The case is to be called for further hearing upon Aug. 20.

Judge Wade refused, however, to grant an immediate increase fare replying that the city had a right to take steps for temporary relief for the company.

SEVEN-CENT FARE RESOLUTION COMING

Members of the City Council of Des Moines seemed ready to base a movement for increased fare on Judge Wade's ruling and Commissioner Budd announced that early in the coming week he would introduce a resolution in Council increasing the rate to 7 cents contingent upon the company increasing service and making satisfactory wage arrangements with the men.

The difficulties which have beset the Des Moines Company have been the subject of comment previously in these pages. The court decision on the wage arbitration some time ago attracted especial attention.

City Lends Aid

Co-operating with Rail-Light in Perfecting Toledo Service-at-Cost Grant—Company Encouraged

Attorneys for the Toledo Railways & Light Company and for the city of Toledo are now joining efforts to make the Milner cost-of-service ordinance error-proof before it goes to the City Council for passage before submission to the people of the city. When it was definitely known that municipal ownership, as planned by the commission appointed by Judge Killits, had been defeated the city administration prepared to submit to the electorate the measure which has been agreed to by Henry L. Doherty on behalf of the company.

ULTIMATE CITY OWNERSHIP

The cost-of-service ordinance for Toledo was drawn by a commission of five business men and is said to be one of the most modern of its type. It provides virtually for city ownership of the lines in the course of several years. The life of the grant is twenty-five years with a privilege of extensions at the end of the first ten years of its operation. Whenever the property has been amortized through the working of either the sinking fund provisions for retirement of bonds or the amortization fund on its last fifteen years, the property comes into the possession of the city.

The valuation agreed to in the ordinance is \$8,000,000. This was reached after months of negotiation and finally agreed to by Mr. Doherty when it looked as though the municipal ownership enthusiasts might endanger the property by a poorly constructed and ill-planned effort toward public ownership of a transportation system.

The ordinance will probably be submitted to Council for passage on Aug. 25. It is now in committee and it is thought will be reported out favorably. The city law director and the Mayor have asked the traction attorneys to work with them in making the attempt to pass the ordinance and to make its adoption absolutely legal in every step. It will probably be submitted to the people at the general election on Nov. 2.

If Council fails to pass the ordinance it may be submitted to the people on an initiative petition signed by approximately 9,000 Toledo voters.

HEAVY VOTE ON MEASURES

The vote on the twin bond ordinances was the most decisive registered in any election on local street railway questions. The \$3,000,000 bond ordinance received only 8,534 favorable votes while it had 12,463 registered against it. The \$4,000,000 twin ordinance received 7,901 favorable votes and 11,543 against it. Foreign wards brought in a slight majority for the measure while wards represented in Council by socialists voted against the public ownership propositions by large majorities. The "silk stocking" seventh ward voted almost 6 to 1 against the two ordinances.

Only four of sixteen wards turned in small favorable majorities.

The vote was fairly typical of many other communities. The people of Toledo have voted several times in favor of municipal ownership of the street railway system when public ownership was merely a general principle and not hitched up to a specific and concrete plan for spending money. The vote itself was the first one favorable to traction interests since the Toledo railway problem has been before the electorate in one form or another for the last fifteen years.

The company immediately felt encouraged to go forward in improving many of its properties and orders were given to paint the cars and rush track repairs.

LOWER FARE POSSIBLE

It is thought that a campaign of popular education on the cost-of-service plan may be able to secure its adoption at the election in November. All civic agencies have united in favor of it during the negotiations with Mr. Doherty over the matter of valuation. Coupled with the fact that it is drawn by citizens and provides for ultimate municipal ownership, it will also introduce a lower fare than the rate now in force and this feature may have vote-getting possibilities.

Strike on New York City Suburban Line

Service on the Manhattan & Queens Traction Company's lines between Manhattan and Jamaica was suspended entirely on Aug. 14 after the eighty-five employees of the company had voted unanimously to strike for wage increases of from 11 to 13 cents an hour. The company offered an increase of 5 cents an hour in an ineffectual effort to avert the walkout.

Unless a petition now before the Public Service Commission asking for a fare increase to 13 cents is allowed the company will be unable to meet the demands, officials of the line declared. The petition is for a zone system, the fare from Fifty-ninth Street, Manhattan, to Grand Street, Corona, to be 5 cents, and from there to the Jamaica terminus 8 cents. The fare for the entire distance is now 5 cents.

The company is in the hands of receivers. It has been striving for more than a year to obtain permission to increase fares. The company operates a line between Second Avenue and Fifty-ninth Street in Manhattan and the Long Island Railroad Station in Jamaica, a distance of about 11 miles. Its average daily traffic is about 14,000 passengers. An application by the company to the Public Service Commission for permission to raise the fare was nullified by the city, which obtained an injunction preventing the commission from considering it. Later the Court of Appeals reversed this action and the company has now pending before the commission an application for permission to increase fares.

All Lines Operating

Denver Tramway Restores Service on All Routes with Aid of Strikebreakers—Men Still Out

Although the employees of the Denver (Col.) Tramway are still on strike, every line in the city including the Interurban Lines to Golden, Arvada and Leyden have been in operation since Wednesday morning, Aug. 18. More than four hundred new men have been hired permanently to replace the strikers. G. H. Harry, representing the Department of Labor, arrived in Denver on Wednesday. After conferences with union leaders and later with General Manager Hild, Mr. Harry informed the newspapermen that he would stay in Denver until a settlement had been reached but that he had arrived after both parties to the controversy had fought each other to a standstill and that "about all he could do was to bury the corpse."

A MASS meeting of striking car men was called for Friday morning. They were to be addressed by Mr. Harry, who in company with Gov. Oliver Shoup held a conference with General Manager Hild on Thursday afternoon.

STRIKERS LOSE SENIORITY RIGHTS

Return-to-work applications signed by 900 of the strikers are reposing at strike headquarters until the strike leaders make up their minds whether to present them to the company. President Silberg and other members of the union executive committee are still in jail. Their four lawyers have announced that they will get them out of jail "if it takes them ninety days."

The radical section of the Denver Trades and Labor Assembly voted to demand a general one-day strike of all unions on Aug. 23 in sympathy with the tramway workers. Conservative union men oppose the movement.

At midnight on Thursday, Aug. 12, all tramway employees who had not filed applications for re-employment lost their seniority rights, pension privileges, and standings in the wage scale. On Friday it was reported that more than 100 former employees in the train service, shops and engineering department had applied for reinstatement. The remainder of the strikers refused to return to work upon assurances of the union leaders that their trump card was yet to be played. Men whose seniority dates back fifteen, twenty and twenty-five years are among those who have lost their rights by their refusal to file applications.

LEADERS WON'T RESIGN

The broad hints of Judge Greeley Whitford of the Federal District Court that the executive committee of the union should resign were met by declarations on the part of the committee members that they would not resign and that jail had no terrors for them.

Operation of the cars by strikebreakers unfamiliar with switches and curves has resulted in one runaway down a grade and four or five collisions and two derailments at high speed. There were no serious injuries.

Most of the jitney buses had gone out of business by Saturday, Aug. 14, upon the operation of as high as 215 motor cars by the tramway on all city lines except one, which was blockaded by sewer construction.

The annual convention of the Colorado State Federation of Labor at Pueblo on Aug. 13 requested Governor Oliver Shoup to have the strikebreakers discharged and former employees reinstated in their position. Governor Shoup replied as follows:

I would be more than pleased to have the former employees of the Denver Tramway restored to their positions and I have used my best efforts to that end. But, as Governor, I cannot dictate to a private corporation whom it shall employ any more than I can dictate to an employee whether or not he shall work.

The men have refused to return to work and I am unable to demand, or reasonably request, the company to discharge any men who are willing to provide the public with service. My first duty is to the people, whose interest in this controversy is paramount to either company or strikers.

The "trump card" of the union came to light Saturday, Aug. 14, when it was announced that, at the request of Vice-President Fitzgerald of the Amalgamated Association, G. Y. Harry, a Government mediator, was enroute from Portland, Ore., to attempt a settlement of the controversy in accordance with instructions from the United States Department of Labor. General Manager Hild said that he would be glad to talk to Mr. Harry, but that the settlement of the tramway controversy was rapidly progressing through the building up of an entirely new organization of employees and that the company's position was unchanged.

Early Sunday morning 150 strikebreakers were shipped out of Denver by the tramway from its South Division carhouse. After the exodus of strikebreakers 150 new employees, together with all former employees who have been re-instated, were placed in charge at the South Division and took over the operation of all lines operating from this carhouse.

FREE JITNEYS A UNION WEAPON

The Amalgamated brandished a new weapon beginning Monday in the form of free jitney service, in an effort to force the tramway to accept the strikers' terms of settlement. These jitneys are attempting to duplicate service on all tramway lines. About 100 automobiles of all sorts are being employed in the service. The union is paying \$4.50 a day to the strikers driving the cars and providing free oil and gas. No fares are charged, but gratuities are accepted.

Reports were circulated Monday that labor leaders had made a deal with the City Council whereby the company was

to receive a 7-cent fare providing the strikers were taken back as a body and given a 62½-cent wage scale. When told of the 7-cent fare settlement plan, General Manager Hild said that he "did not see how the tramway could change its position, and that he and other officials had been so absorbed with the speedy restoration of service that the matter of a higher fare had been given no thought at all."

SEVEN-CENT FARE NOT ENOUGH

The company had previously announced that even with a 7-cent fare it could not grant a wage increase above 58 cents an hour, since all surplus revenue from increased fare would be needed for improvements and extensions of service.

An unexpected blow to union hopes came Monday afternoon when Judge Whitford sentenced the seven members of the union's executive committee to serve ninety days in the county jail and to pay the cost of court proceedings occasioned by the strikers' action. The union heads were taken immediately to the county jail.

UNION CHIEFS GO TO JAIL

In a last-minute attempt to stave off jail sentences the union attorneys entered as evidence of good faith 847 applications from members of the union signifying their intention of returning to work. These were individual applications, and according to the attorneys, had "no strings on them." The court declared that the applications could not be considered, especially since they had not been presented to the company.

Judge Whitford, in passing sentence, said:

There are mitigating circumstances in connection with this action which the court cannot and will not overlook. To impose a small fine, however, would not be in keeping with the dignified administration of the law; a few days in jail would not, either, command respect. The court must administer the laws of the people without fear or favor, and must see that every infraction of same is adequately punished. The court, on hearings, has found that your action has been in violation of the laws of the majority of the people. It cannot do aught but impose a penalty.

Men Accept Winnipeg Award

Acting under protest, representatives of the union employees of the Winnipeg (Man.) Electric Railway have signed an agreement with the company providing for an increase in pay of approximately 10 per cent. The pay increase was recommended by the Myers board of arbitration, which heard the demands of the men for an advance amounting to 50 per cent.

The award as rendered was accepted by the company although it will mean an additional expenditure of about \$300,000 annually, but was rejected by the men on the ground that they were entitled to at least 20 per cent more.

The agreement is effective from May 1, and the back pay to date under the conditions of the award will amount to approximately \$70,000.

Financial and Corporate

I. R. T. Deficit Cut

New York's Commissioner Reports Surplus from Subway Operation for Last Six Months

A statement of the financial condition of the Interborough Rapid Transit Company, New York, N. Y., prepared by Transit Construction Commissioner John H. Delaney and made public on Aug. 14, showed that the earnings of the company on the city-owned subways during the last six months of the fiscal year ended June 30 last were sufficient to meet fixed charges and pay \$5,330,005 of the company's annual preferential of \$6,335,000.

The jump from a monthly deficit to a monthly surplus began in December, 1919, when there was a surplus of \$100,973, compared with a deficit of \$67,045 in the preceding month. Thereafter there was a surplus every month except that there was a deficit of \$16,607 in January and \$199,703 in June.

The following table shows the gross revenue per month and surplus or deficit:

Month	Gross Revenue	Deficit
July, 1919	\$2,149,087	\$299,212
August, 1919	2,052,741	408,917
September, 1919	2,286,301	325,264
October, 1919	2,586,303	145,945
November, 1919	2,614,894	67,045
December, 1919	2,948,520	*100,973
January, 1920	2,810,709	16,607
February, 1920	2,799,402	*86,597
March, 1920	3,039,540	*171,452
April, 1920	2,871,271	*53,319
May, 1920	2,850,011	*46,258
June, 1920	2,614,189	199,703

Total \$31,622,973 1,004,095

*Surplus.

SUBWAY DEFICIT \$3,370,879

The total deficit of the subway division, including interest on previous deficits, amounted to \$3,370,879. Deficits are cumulative and they must be paid, with interest, before any interest is paid on the city's investment. The operating expenses for the subways during the year totaled \$12,785,581. The other principal expenses were: Maintenance, \$3,794,756; rent paid the city under the original subway contract, \$2,428,487; interest on the company's contribution for construction, \$2,938,944; interest on equipment, \$1,320,000; company's preferential, \$6,335,000. The total charges for the year amounted to \$32,627,068.

During the first six months of the year the earnings fell \$1,145,412 below costs, and during the last six months they exceeded the costs by \$141,316, after all of the company's obligations, including the preferential, were met. The large earnings in March were explained by Mr. Delaney, who said that during that month the surface car traffic was crippled because of weather

conditions. He also said that during June of the current year the gross revenues were \$326,427 more than in the same month in 1919, when the deficit amounted to \$233,059.

The Manhattan elevated division of the Interborough system, which costs the company rent of 7 per cent on a valuation of \$60,000,000, was the company's most serious liability. Prior to the last fiscal year the deficit grew from \$8,231,994.31 to \$15,320,158.62. Gross operating revenues for the year amounted to \$19,829,482, and expenditures, including operating costs, rent, maintenance, depreciation, interest charges and the preferential of \$1,589,348, reached \$26,214,269.91, leaving a deficit for the year of \$6,384,786.

FIGURES FROM BROOKLYN

Figures filed by the Brooklyn Rapid Transit Company showed that the rapid transit lines of the company earned \$19,562,212.80 during the fiscal year and that the preferential of \$3,500,000, operating expenses, taxes, depreciation, etc., amounted to \$22,386,406, which left a deficit of \$2,824,193, exclusive of the interest charges on the city's investment.

Passenger revenues for the year were \$18,842,994, against \$15,255,720 for the fiscal year ended June 30, 1919. There was an increase in receipts from advertising and station privileges. Mr. Delaney gave these additional particulars concerning the financial condition of the company:

Operating expenses for the last fiscal year were \$11,274,127, an increase over the preceding year of \$3,165,974. Maintenance expenses were \$2,629,219, an increase of \$586,511 over the preceding year. The maintenance account for the year exceeded the contract allowance of 12 per cent of gross revenue by \$775,336. The total revenues of the company since the signing of the contract between the city and the company on Aug. 4, 1913, have amounted to \$85,996,084 and the total operating expenses have been \$39,855,239. Allowances to the company under the preferential of \$3,500,000 have been \$24,180,107.

Municipal Railway Budget Decreased

Operation of the Municipal Street Railway in Seattle, Wash., for the year 1921 will cost \$706,902 less than in 1920, according to the estimates completed by the City Council budget committee. The total cost of operation for the year has been placed at \$6,186,910, the Council having cut off only \$8,400 from the estimate as prepared by the department. The reduction was effected by eliminating a number of positions which had been asked for. The total sum includes an item of \$2,400,000 for wages for trainmen; \$394,546 for ways and structures; \$618,644 for shops and car houses; \$858,744 for interest on bonds, and \$660,000 for power.

Gain in Net Income

Surplus Earnings Increase Over \$115,000 with a Percentage Change of Nearly 24 Per cent

In a report issued for the year ended March 31, 1920, the United Light & Railways Company, Grand Rapids, Mich., showed a gross earning from all sources of \$10,534,834. This was an increase over 1918 of \$96,310 or 10.1 per cent. The operating expenses, which also included maintenance and income taxes, were \$7,504,084 for 1920. Compared with \$6,737,721 in 1919 the increase was \$766,363, or 11.4 per cent. Net earnings for 1920 was \$3,030,750. This was an increase of \$199,946, or 7.1 per cent over 1919.

BALANCE FOR SURPLUS \$611,792

After paying all the interest on bonds and notes and dividends of the subsidiary companies' stock, and paying the interest on its own bonds and notes, and dividends on preferred stock, the balance for surplus in 1920 was \$611,792. Compared with \$495,070 in 1919 the increase was \$116,722, or 23.6 per cent.

From the surplus accounts of subsidiary companies \$71,490 was transferred to their depreciation reserve. In addition the subsidiary companies expended, or set aside for maintenance, \$730,945. This was charged directly to operating expenses. This made the total amount expended, or set aside for maintenance and depreciation of property, \$802,435, or more than 9.8 per cent of the gross earnings. The operating expenses also include \$509,539 accrued for payment of general and federal taxes, an increase of \$123,779 for the fiscal year.

The statement of earnings contained in the report of the United Light & Railways Company follows:

	1920	1919
Gross earnings, all sources	\$10,534,834	\$9,568,525
Operating expenses (including maintenance, general, and income taxes)	7,504,084	6,737,721
Net earnings	\$3,030,750	\$2,830,804
Interest on bonds and notes, subsidiary cos. due public	\$721,274	\$720,958
Dividends and earnings on preferred stocks, subsidiary companies due public	170,427	170,824
Profit due minority stockholders	11,299	7,972
Balance	\$2,127,751	\$1,931,050
Interest on first and refunding 5% bonds, United Light & Railways Company	453,287	435,896
Balance	\$1,674,464	\$1,495,154
Interest on 6% five-year bond secured gold notes United Light & Railways Company	67,033	90,000
Interest on 6% two and one-half year bond secured gold notes, U. Lt. & Rys. Co., Series "A"	90,000	90,000
Interest on 7% five-year bond secured gold notes United Lt. & Rys. Co., Series "B"	105,000	50,654
Interest on 7% one-year bond secured gold notes United Lt. & Rys. Co., Series "C"	31,556	
Interest on ten-year 6% convertible gold debentures U. Lt. & Rys. Co.	120,000	120,000
Interest on commercial loans, United Lt. & Rys. Co.	44,798	42,316
Balance	\$1,216,076	\$1,102,184
Dividends on first preferred stock 6%	604,284	607,114
Surplus earnings	\$611,792	\$495,070

Buffalo Reorganization Details Made Public

Company Needs Funds to Make Good Its Operating Deficit and Provide for Renewals and New Construction

Formal notice of the reorganization details agreed upon by the bondholders' protective committee have been mailed to bondholders of the International Railway, Buffalo, N. Y., by Elliott C. McDougal, chairman of the committee and president of the Bank of Buffalo. Chairman McDougal warns that the company has an operating deficit of \$2,000,000 and that it is imperative at this time to make immediate provision for funds to meet maturing obligations and for rehabilitation purposes.

IF THE bondholders' committee is obliged to abandon the plan which has been agreed upon, there is danger that the securities of the company will be sold at public auction to satisfy the loans for which they stand, according to Mr. McDougal. In this event, he says, there will be nothing left for distribution among the bondholders.

CAN ISSUE NO MORE BONDS

Chairman McDougal points out to the bondholders that because of the provisions of the supplemental indenture of its refunding and improvement 5 per cent gold mortgage the railway will not be able to issue any additional bonds under the mortgage until its earnings for a period of twelve consecutive months shall have equalled or exceeded approximately \$800,000 over all charges ahead of the stock.

It is accordingly imperative to make provision at this time for more than the immediate needs of the railway. In order to make the financial position of the company reasonably safe, Chairman McDougal and the committee estimate that it will be necessary to sell securities sufficient to raise about \$3,800,000 and to hold some securities in reserve for possible future needs. Out of a total of \$18,325,000 in principal amount, there have been deposited under the protective agreement about \$8,100,000 in principal amount of the 4 per cent bonds of the International Traction Company. The committee has decided it will not receive any more bonds for deposit under this agreement.

WILL INCREASE STOCK

The committee in its recommendations to the security holders proposes to cause the stock of the railway to be increased from \$16,707,500 par value to an amount equal to 95 per cent of the principal amount of the 4 per cent bonds of the International Traction Company which have been deposited under the protective agreement and to exchange all of this stock for voting trust certificates issued under an appropriate voting trust agreement.

The committee proposes to offer to each depositor of a \$1,000 4 per cent bond of the International Traction Company, the opportunity to purchase \$200 in principal amount of refunding and improvement 5 per cent bonds of the railway for \$100 plus accrued interest on such bonds, and also the opportunity to purchase voting trust certificates for nine and one-half shares of stock of the railway for \$100.

The committee proposes to sell to underwriters and others at these prices the portions of the refunding and improvement 5 per cent bonds and the voting trust certificates for stock of the railway company which the depositors do not elect to purchase in accordance with the offers to be made to them.

The depositors will be allowed such time after the offers as it shall deem to be reasonable for making elections to purchase the 5 per cent bonds or the voting trust certificates for stock of the price for the bonds will be payable at the time of making the election to purchase. Fifty per cent of the purchase price for the voting trust certificates will be payable at the time of making the election to purchase and the balance thereof at such time or times in 1921 as the committee shall determine. The committee may reserve to sell for account of the purchaser any voting trust certificates upon which any installment of the purchase price is not paid when due, holding such purchaser liable for any such deficiency. The bonds and voting trust certificates are to be delivered upon payment of the purchase price in full.

PROPERTY TRANSFER PLANNED

After paying and discharging its obligations and expenses, including the compensation of its members, the committee proposes to pay and transfer to the International Railway, or to trustees for its benefit, all cash, securities and other property which may remain in the hands of the committee, including \$640,000 in principal amount of underlying first mortgage 6 per cent bonds.

Through the co-operation of a group of Buffalo bankers associated with the Marine Trust Company, the Bank of Buffalo and the Manufacturers & Traders' National Bank, the committee is enabled to make underwriting arrangements at moderate expense which will enable it to sell at the prices above mentioned all of the refunding and improvement 5 per cent bonds and voting trust certificates for stock of the railway, which the depositors do not elect to purchase.

If this plan of readjustment is carried out, it will, in substance, provide each depositor the opportunity to acquire his pro rata interest in the collateral by which the 5 per cent bonds of the International Traction Company were formerly secured, upon his paying his pro rata share of the cost protecting the collateral and rehabilitating the International. In the judg-

ment of the committee, it is the most desirable and equitable plan that is feasible under the circumstances. The financial provisions are no more extensive or burdensome to the depositors than are said to be necessary for the proper protection of their interests.

The railway has been in serious danger of incurring a default under its refunding and improvement gold mortgage, but with the financial provisions and the improvement in management which are now proposed by the committee, it is felt that the future of the railway is reasonably safe.

OPERATING DEFICIT \$2,000,000

The committee points out that owing to the great increases which have taken place in the cost of operation and the failure of the former management to make adequate reserves the railway has created an operating deficit of \$2,600,000. It is recited that the wage advance granted the company's employees absorbed the fare increase and the company now is in need of funds to make good its operating deficit and provide for necessary renewals and new construction.

The committee, Chairman McDougal says, deems it essential to provide for stability of management under the direction of Thomas E. Mitten, president of the Philadelphia (Pa.) Rapid Transit Company, who is a member of the bondholders' protective committee.

Claims of \$777,571 Disallowed

The Quebec Public Service Commission has decided against the company in the appeal of the Montreal Tramways from the decision of the Montreal Tramways Commission in the matter of allowing \$534,055 to be added to the company's working capital. On Aug. 25, 1919, the Tramways Commission deducted the sum of \$534,055 from the amount of the company's working capital. The judgment of the commission read:

It was resolved that of the amounts of working capital for which interest at the rate of 6 per cent per annum is claimed by the Montreal Tramways from Feb. 10, 1918, to June 30, 1919, the amount of \$534,055, representing the reproduction cost of stores in hand, included in the valuation schedule "A," of the contract, be deducted.

It was from this ruling that the company appealed.

Colonel Hibbard, chairman of the Quebec Public Service Commission, who writes the judgment, believes it to be clear that the \$534,055 was included at the book value of stores in hand as per the inventory of June, 1917, and that this sum is entered in the total sum of \$36,286,295, the allowed capital value of the company's system. The company contended that the sum of \$534,055 should have been allowed it as working capital.

The Quebec Public Service Commission has also rendered judgment in another appeal of the tramway against a judgment of the Montreal Tramways Commission, which had disallowed a claim of the company to have accounts totalling \$243,516 credited for the 6 per cent.

Lessee and Lessor at Odds in Philadelphia

Mr. Mitten's Plan for Simplification of Corporate Structure and Economies Opposed by Underlying Holders

Thomas E. Mitten, president of the Philadelphia (Pa.) Rapid Transit Company, has resigned as a director of the Union Traction Company, operated under lease by the P. R. T. Lessee and lessor company appear to be at odds, with Mr. Mitten of the opinion that the leased company seeks to impose burdens on the operating company that are far too exacting. On the other hand, officials of the Union Traction Company have thought that Mr. Mitten was aiding the effort to reduce the rentals paid by the company to the underlying corporations, of which the Union Traction is the largest.

JEREMIAH J. SULLIVAN, president of the Union Traction Company, has sent the following letter to Mr. Mitten:

In view of the persistent rumors that the Philadelphia Rapid Transit Company is aiding or at least in sympathy with the attacks on the rentals of its underlying companies, we write to ask you if you will not contradict these rumors.

We would like to know also if the Philadelphia Rapid Transit Company has any intention of trying in any way to cut down the rentals payable to the Union Traction Company under the lease of July 1, 1902, or would in any way aid or sympathize with any such attempt to reduce the rentals so payable to this company.

Under the terms of the agreement of 1902 the Union Traction Company must give its assent to any financial measures advanced by the operating company. In pursuance of the agreement the Philadelphia Rapid Transit Company sought the consent of the Union directorate to the floating of \$6,000,000 car trust certificates. The Union Traction, in replying, stated that it would consent only if the P. R. T. would transfer the ownership of every available security that it has or ever will get. Among the demands of the underlying company were:

That a new contract be entered into which would safeguard every right the Union Traction possessed. In that agreement it wished to obtain ownership of all the near-side cars that still remain in the possession of the P. R. T.

That all the interest the P. R. T. has in the Motor Real Estate Company, amounting to \$4,000,000, should be transferred to the Union Traction and that every interest the company now holds should be handed over to the Union Traction Company before it agrees to the necessary car-trust certificate issue.

Among the assignments mentioned are those of all the company holdings in the Willow Grove Park Company, the Chester & Philadelphia Railway Company, the Continental Passenger Railway and others.

In addition the Union directors sought to have the P. R. T. sign over all its real estate holdings and all that it might acquire. On none of the assets thus turned over was the P. R. T. to secure a loan without an approving resolution by the underlying body of directors.

Mr. Mitten in return submitted a proposal for the consolidation of the four principal underlying companies with the P. R. T. into one compact body. Under the plan of consolidation drawn up by Mr. Mitten the fixed charges of the company would be reduced from \$11,000,000 approximately to \$6,000,000. However, that plan entailed an assessment of \$10 on every Union Traction stockholder for every share he held. That proposition was voted down and Mr. Mitten, after scru-

tinizing the terms under which the Union Traction would give its consent to the loan, submitted a counter proposition.

Mr. Mitten later wrote a letter in which he offered to make over to the Union Traction the real estate and stocks of the underlying companies that the P. R. T. owned, and also agreed to sign over the 500 cars that the P. R. T. had bought since 1902 when the lease was promulgated. He, how-

may yet see that its own, as well as the interests of the public and of P. R. T., will be best served by the adoption of a different spirit toward the transit problem—a spirit to which the accompanying plan is a tentative effort to give formulated expression. Nevertheless, my now continuing to act as a director of Union would be embarrassing, and I therefore desire to make my resignation, herewith tendered, effective forthwith.

In the full text of his proposal Mr. Mitten points out that under his plan the fixed charges of the new company would at the outset be \$5,000,000 a year, as against the present charge of nearly \$10,000,000. He says that credit is at once established by this change and the way opened to a further consolidation and the issuance of a general first and refunding mortgage by which securities of underlying companies could be retired and the capital needs of the operating company provided for. On the matter of leases and their value, Mr. Mitten says:

All the lease-holding companies would do well to bear in mind that, as their existence is dependent on leases, so the value of those leases is dependent on the ability of

PROPOSED NEW UNDERLYING TRACTION COMPANY UNDER MITTEN CONSOLIDATION PLAN—CAPITALIZATION AND RETURN

	Stock of New Company	Rate	Dividends, Amount	Capital Paid In	Surplus
People's Traction }	1st pf. *\$14,865,057	8%	\$1,189,204.56	\$6,000,000	.....
Electric Traction }				8,297,920	.....
Philadelphia Traction.....	1st pf. 20,000,000	8%	1,600,000.00	20,000,000	\$486,220
Total first preferred stock.	\$34,865,057		\$2,789,204.56		
Union Traction.....	2d pf. 30,000,000	7%	2,100,000.00	10,500,000	3,753,141
\$10 per share assessment.....				6,000,000	.....
Philadelphia Rapid Transit	.....	\$2.50			
600,000 shares.....	No par value a share		1,500,000.00	30,000,000	4,482,120
	\$64,865,057		\$6,389,204.56	\$80,797,920	\$8,721,481
Total paid in capital and surplus.....					\$89,519,401
Preferred stock of new company.....					64,865,057
Equity of common stock (for P. R. T. equals \$41.09 per share).....					\$25,654,344
Note—					
8% on \$89,519,401 capital and surplus allowed before Federal tax is.....			\$7,161,552.08		
Dividends on stocks of all five companies would only be.....			6,389,204.56		
Leaving additional earnings permitted before Federal tax applies of.....			\$772,347.52		

* Takes the place of \$29,730,114 E. and P. 4s.

ever, refused to hand over the ownership of the Chester & Philadelphia Railway or the holdings in Willow Grove Park. The ownership of the bonds of the underlying companies Mr. Mitten desired to keep for use in future financing of the company. In conclusion, Mr. Mitten wrote that he had not joined in the attack on the underlying company rentals, nor would he do so as long as he had the co-operation of the Union Traction Company.

The Union Traction directors flatly rejected the counter-proposal on the ground that it did not conform with their requests.

In withdrawing from the Union Traction Company Mr. Mitten wrote to Mr. Sullivan in part as follows:

I am not, and never have been, in sympathy with Union's policy of exacting P. R. T.'s equities as the price of Union's consent when required to secure additional capital to be spent upon the leased property; but, on the contrary, have repeatedly stated to your board my belief that Union's stability depended largely upon Union's strengthening its lease.

Union's latest demand that, as the price of its consent to the proposed \$6,000,000 car trust, P. R. T. shall give to Union every equity that P. R. T. now possesses, and in addition agree to make over to Union all property which P. R. T. may hereafter acquire, is both unreasonable and destructive. I do not relinquish the hope that Union

the company operating the physical properties to make them profitable. This applies with equal force to all of the five companies, and, in fact, unless an individual property is such that the real owner of that particular property can see clearly that he can operate his own property on a paying basis, in case it were returned to him, it is equally to his interest to see that the operating lessee is successful and to assist his lessee by every means in his power.

Permission of the Public Service Commission to withdraw the fare-increase petition now before it will be sought at once by the Philadelphia Rapid Transit Company. That was announced on Aug. 17 by Mr. Mitten. From the offices of the railway the following statement was made:

Mr. Mitten today announced that the P. R. T. will at once petition the Public Service Commission to withdraw the application for fare increase now before the commission, and that he would notify the Mayor and city solicitor accordingly.

Earlier in the day Mayor Moore had said:

It is a question of reducing the underlying rentals or increasing the fares.

In view of the handicap under which the Rapid Transit Company is laboring, I do not see how it can get along without higher fares. The people want better service, better cars and better equipment generally.

In addition to the problem of satisfying these wants, the company is greatly handicapped by the excessive underlying rentals. Therefore something very definite will have to be done to increase the company's income.

Financial News Notes

\$85,000 of Bonds Authorized.—The Public Utilities Department of Massachusetts on Aug. 10 authorized the Holyoke Street Railway to issue bonds to the extent of \$85,000 to mature in April, 1935. They will bear interest at 6 per cent. The new issue is put out to retire another which matures this year.

Southern Road Decreases Capital.—Notice of a decrease in the capitalization of the Alabama City, Gadsden & Attalla Railway Company, Gadsden, Ala., has been filed with the Secretary of State. In this notice the company stated that its authorized capital stock had been cut from \$330,000 to \$6,600.

Resort Line to Reopen.—Service will be resumed by the Southwestern Gas & Electric Company, operating the electric railway system in Texarkana, Tex., and Texarkana, Ark., on its line to Spring Lake Park. The park, formerly owned by the company, has been sold to the city. Operation of the line was discontinued several years ago.

Refunding Operation Approved.—An order by the California Railroad Commission authorizes the Pacific Electric Railway, Los Angeles, to issue bonds to the amount of \$200,000 to refund bonds of the Riverside & Arlington Railway, which is now part of the Pacific Electric system. The bonds are owned by the Southern Pacific Company, which is willing to accept Pacific Electric bonds in payment therefor.

Texas Road Ordered Sold.—The Bryan-College Interurban Railway, operating from Bryan, Tex., to College Station, where the Texas Agricultural & Mechanical College is located, a distance of about 6 miles, has been ordered sold at public auction by Judge J. C. Hutcheson of the Southern District of Texas at Houston. The line has been in receivership for some months. The sale will be made by Guy Graham, Houston, on Sept. 8.

San Francisco May Vote on Railway Purchase.—The people of San Francisco, Cal., are to be asked to vote next November on the proposal that the city purchase the United Railroads, if the decision reached by the public utilities committee of the Board of Supervisors on Aug. 11 is carried out. The appraisal of the properties is yet to be made. The city attorney has been asked to draw up the charter amendment which would be a prerequisite to the proposed purchase.

Purchase Plan Promoted.—The Chamber of Commerce of Bloomfield, W. Va., has agreed to promote a plan of the Princeton Power Company to take over the electric railway system of

the Appalachian Power Company in Bluefield and Graham, Va., and own and operate it in the future. The Princeton company will put the deal through providing the people of the city subscribe for \$50,000 of preferred stock. This money would be utilized at once in the rehabilitation of the present system by providing immediately better cars and improving the roadbed.

Birmingham Plans Railway Survey.—A preliminary survey of properties of the Birmingham Railway Light & Power Company, Birmingham, Ala., as a basis of negotiations for a re-organization of the company has been authorized by the City Commission. The work will be done by I. W. Ross, consulting engineer for the city. At this time no attempt will be made at an actual appraisal of the properties. The commission instructed the engineer to make a survey of the properties and present a report to serve as a basis on which the city may start negotiations looking toward the working out of its plan.

May Seek to Stop Operation.—Announcement has been made by City Solicitor H. G. Pratt of Martin's Ferry, Ohio, that the city will not attempt to stop cars of the Wheeling Traction Company following the expiration of the company's ordinance, as the ordinance which repealed the franchise under which the company is operating contains a provision that the company may have twenty days in which to remove all equipment from the city. After the expiration of twenty days the city, it is expected, will file a petition for injunction proceedings in the courts, if the company has not complied with the provisions of the ordinance by that time.

Bids Asked for Bonds for Sinking Fund.—Holders of the first and refunding sinking fund mortgage twenty-five year 5 per cent gold bonds of the Denver (Col.) City Tramway have been notified that, on Nov. 1, the company will pay 1 per cent of the principal of the bonds issued and outstanding and the annual interest on all bonds purchased for the sinking fund, amounting to not less than \$154,365 to be used for the redemption of bonds for the sinking fund. Sealed proposals for the sale of the needed bonds to exhaust the sinking fund will be received by the Bankers Trust Company, New York, on or before Aug. 24 and those offered at the lowest price, not exceeding par and accrued interest with a 5 per cent premium, will be paid.

Massachusetts Road to Be Sold.—The Board of Trade of Canton, Mass., has declined to entertain a plan to buy the property of the Blue Hill Street Railway in that town and operate it by public subscription. The Board of Trade felt that it would cost too much to buy the line, rehabilitate it and purchase new cars. It is understood to be the intention of the Canton citizens to organize a motor bus line. The Selectmen of Milton have been notified of the intention of the receiver of the Blue

Hill company to sell it for junk. It is said that the buyers of the property are to pay about \$59,000 for the Blue Hill Street Railway rails in Milton, Canton, Stoughton, Sharon, Norwood and Readville, about 18 miles in all. Perry, Buxton & Doane are the prospective purchasers.

Wages Increased in Asheville.—Arbiters in the wage controversy between the Asheville Power & Light Company, Asheville, N. C., and its trainmen have granted the men wage increases amounting to approximately 29½ per cent. The award was accepted mutually, owing to a previous agreement to leave the decision entirely in the hands of a board of arbiters composed of W. O. Wolfe, Jr., appointed by the men; W. C. Hopson, New York City, appointed by the company, and W. G. Fortune, an attorney of Asheville, appointed by both factions as umpire. The new scale is as follows: First six months' service, 48 cents an hour; second six months, 49 cents an hour; third six months, 50 cents an hour; fourth six months and thereafter, 56 cents.

Valuation Preparatory to Purchase by City.—A hearing was held on Aug. 4 before the Public Service Commission of New Hampshire involving the making of an appraisal of the Exeter, Hampton & Amesbury Street Railway to determine the fair value of the railway with a view to its acquisition by the town of Hampton. The railway about two years ago was authorized by the commission to abandon a certain portion of its lines provided the towns did not, prior to a date set by the commission, agree to the purchase of the railway or decide to enter into a contract with the railway under which service could be continued without loss. The Town of Hampton and the railway have since been in negotiation, with a view to the sale of the property to the town, but the negotiations were terminated upon the failure to reach an agreement.

Car Trust Certificates Offered.—Casatt & Company, New York and Philadelphia, are offering for subscription a 100 accrued dividend to yield 8 per cent \$1,000,000 of Northern Ohio Traction & Light Company car trust 8 per cent gold certificates. These certificates are issued under the Philadelphia plan with the Fidelity Trust Company, Philadelphia, as trustee. They are dated Aug. 1, 1920, and mature serially to 1925 on the rate of \$100,000 every February and August. The equipment under the trust will be leased by the trustee to the Northern Ohio Traction & Light Company, Akron, Ohio. It will consist of twenty steel interurban passenger cars, fifty-six Peter Witt city passenger cars, and ten Cleveland type passenger trail cars, fully equipped being built by the G. C. Kuhlman Car Company, Cleveland, Ohio, at a total cost of more than \$1,340,000. The total cost of the equipment will, therefore, be more than 33 per cent in excess of the face value of the car trust certificates to be issued.

Traffic and Transportation

Rates May Be Changed

Supreme Court of Iowa Holds That Rates Fixed by City with Local Utility Are Not Binding

The Supreme Court of Iowa has ruled that a contract between a city and a railway which fixes a permanent fare has never been sanctioned by the Legislature of Iowa and that therefore rates fixed in such a contract may be changed.

The decision was rendered in the case of the appeal of the Ottumwa Railway & Light Company from the ruling of the lower court which denied the company an injunction restraining the city of Ottumwa from reducing the fare from 6 cents to 5 cents, the higher figure having been granted as an emergency measure during the war period.

ENDS LONG COURT FIGHT

In April, 1919, the City Council of Ottumwa, which previously had allowed the higher fare, passed a resolution ordering the Ottumwa Railway & Light Company to return to its former rate of 5 cents, declaring that the ending of the war had made unnecessary the continuance of a 6-cent fare. The railway then secured a temporary injunction from the District Court at Ottumwa restraining the city from interfering with the collection of the 6-cent fare. When the case came up for hearing on the permanent injunction Judge Cornell sustained the motion of the city to dissolve the injunction. The case was then appealed to the Supreme Court of Iowa.

The opinion in the higher court was written by Justice Ben I. Salinger. It has the added strength of receiving the unanimous concurrence of all members of the Supreme bench. Justice Salinger held that the case proceeds on the general theory that it is against public policy to contract for unchanging rates, that there must be no such contract because its enforcement might on the one hand fasten what proves to be an exorbitant charge upon the patrons, or on the other prove a rate that will confiscate the property of the service corporation. The decision runs on the broad ground that public policy forbids such contracts unless the Legislature, the ultimate judge of what is public policy, declares unmistakably that such contracts do not offend that policy.

STATE'S POWER SOVEREIGN

Later in the week weight was lent the decision of the Supreme Court by a ruling of Judge Martin J. Wade of the Federal Court in his hearing upon the petition of intervention brought by the railway union of Des Moines. Judge Wade discussed the Ottumwa case and

stated that it was fundamental that a State has the power to enact constitutional laws and that the State has the power through the courts to construe these laws. United States courts, he added, always yield their views to the highest tribunal of the State when statutes of that State are construed.

CAN FIX EMERGENCY RATES

Judge Wade did not state definitely wherein lies the power to fix rates, but throughout the opinion there was an implication that the City Council could and should order a temporary change when such an emergency as the Des Moines case was concerned. While he held that it is without the province of a judge to determine fares he also stated that a judge could prohibit the enforcement of a rate which did not provide for the payment of the interest on the investment.

Court Orders Memphis Rise

As the result of an order issued by Federal Judge Andrew M. J. Cochran on Aug. 16, a 7-cent cash fare was scheduled to go into effect on the lines of the Memphis (Tenn.) Street Railway on Aug. 18. The company was directed to sell ten tickets for 65 cents. Judge Cochran refused to hear further arguments in support of the continuance of the 6-cent fare, holding that the matter had been decided by Federal Judge John E. McCall, since deceased. Judge McCall had ruled shortly before his death that the 7-cent fare should become effective on Aug. 15.

The abandonment of the 6-cent fare followed the report of the receivers of the company on the results of operation during the three-months trial period proposed by Judge McCall to determine the extent of the company's needs. Under an order issued by the State Railroad and Public Utilities Commission the company was to have begun charging a 7-cent fare on April 1. The court secured a postponement of the rate increase in the hope that a 6-cent fare would prove adequate.

The report of the receivers for the trial period of three months showed that the company was running behind and could not continue to operate at the 6-cent fare. Judge McCall, before authorizing the rate increase, signed an order under which wages of the company's employees were raised to a maximum of 57 cents an hour. The wage rise will entail an additional expenditure on the part of the company of \$150,000 annually. The report of the receivers showed expenditures for the three months of \$831,854, with revenues of \$823,918.

Key Route Needs More

Oakland Company Asks California Commission for Another Increase to Meet Wage Rise

The San Francisco-Oakland Terminal Railways, Oakland, Cal., has applied to the Railroad Commission for an order readjusting its passenger fares between San Francisco and Alameda County points. Application is directed exclusively to the interurban trans-bay service in what is known as the "Key Division." It does not involve the "Traction Division" which operates between points in Alameda County and Contra Costa County. The company asks the commission to grant a rate substantially in excess of the amounts granted by the Interstate Commerce Commission. It declares that a one-way fare of 18 cents, such as is provided by the Interstate Commerce Commission in its recent order, would be cumbersome and impracticable to the Key Route and to the public.

DEFICIT OF \$710,550

In a statement accompanying the application, the company contends that for the thirty months ending June 30, 1920, there has been a deficit of \$710,550. The deficit for the six months ending June 30, 1920, is given as \$64,928. The results of the two rate increases granted the company by the Commission, one in June, 1918, and the other in September, 1919, are outlined as follows:

Six months ending December 31, 1918, as compared with the same six months of 1917, gross operating revenue increased \$76,588; actual operating expenses increased \$118,442.

Six months ending June 30, 1919, compared with the same six months of 1918, gross operating revenue increased \$106,196; actual operating expenses increased \$147,688.

Six months ending December 31, 1919 (which included the second rate increase) compared with same months for the year 1918, gross operating revenue increased \$130,918; actual operating expenses increased \$67,212.

Six months period ending June 30, 1920, compared with the same six months of the year 1919, gross operating revenue increased \$135,407; actual operating expenses increased \$109,381.

GROSS OPERATING REVENUE RAISED

The company asserts that during the twenty-four-month period in which the higher rates have been collected, the increase in gross operating revenue totaled \$499,111. The total increase in actual operating expenses was \$443,325. To the total expenses the company contends should be added a State tax of 5½ per cent on the increased gross operating revenue amounting to \$26,203, and actual cash set aside in depreciation fund in accordance with the commission's orders aggregating \$75,262. According to these figures there has been a net decrease, therefore, of \$45,580. It is estimated by the company that increased wages of train men will amount to \$1,835 a month, in addition to the figures given above because of increases effective June 30. The men are now receiving a maximum of 59 cents an hour as against the former maximum of 54 cents.

Jitneys Still Hold Sway

Bridgeport Situation Unchanged Except for Growing Realization That Jitneys Do Not Meet Transportation Demand

Trolleyless Bridgeport, the second largest city in Connecticut, is going about its daily work as usual. More than 170,000 people are dependent for transportation on the jitneys and on private autos. But public opinion is not a unit as to how well the jitneys are functioning. Not by any means. The jitney men and an individual here and there will tell you that all is well, but the merchants and others declare that the salvation of Bridgeport lies in the return of the trolleys.

WITH Bridgeport thus divided against itself, the Connecticut Company remains silent. It is content to wait, as it said at the beginning it would. The Council also appears to be content to wait. The court in its recent decision suspending the jitney regulatory order pointed out wherein the measure was defective. That was its only province. The Council, however, has done nothing since toward amending the measure so as to meet the court's idea. The members apparently have their ears to the ground, and as soon as indications take on a permanent hue it is expected they will act.

MERCHANTS CHANGE THEIR TUNE

At the start the merchants in Bridgeport appeared to be indifferent to the passing of the trolley. They were, however, among the first to protest against the present arrangement and the no-parking rule. Their trade which came by trolley soon began to fall off considerably and the no-parking rule killed much of the patronage which drove downtown in its own autos. Protests about the latter were so loud that on Aug. 16 the Aldermen fixed a twenty-minute parking limit on eleven business streets. The Mayor in recommending the measure said that the business men had appealed to him for greater leeway in the matter of parking. The passage of this measure, however, solves only half the problem of the merchants. It doesn't bring back to the business man the patron who formerly used the trolley and now apparently refuses to shop via the bus. Where this man or woman is now shopping is a conundrum. Some say the trade has gone to the shops in the local community where the individual lives. Others say it has been lost to Bridgeport entirely.

JITNEY MEN PLEASED

As for the jitney men they appear well pleased. Their own opinion is that they are serving the city well, but that there is still some room for improvement. In consequence, rumors are heard of plans to incorporate a bus company for unified service. As a fancy this is a bright idea, but it doesn't appear to appeal very strongly to the itinerant operator who skims the cream of the traffic during the rush hours, night and morning. Nor does the proposal have much compelling power in the face of the fact that the Council may act at any time in line with the court's suggestions and in deference to public demand curb the jitneys.

The average number of jitneys in service is about 425. It is true that the withdrawal of the trolley cars has relieved congestion by making it possible for jitneys to operate two abreast, but it is hardly true that the average rider in Bridgeport enjoys the degree of comfort that he did when both jitneys and trolleys were in use or that he would enjoy under a combined system of trolleys and jitneys properly regulated and articulated.

These statements are general. They are intended to be general. They do, however, present the case as it rests at present. Business men and merchants to whom they were submitted by a representative of this paper who was in Bridgeport on Aug. 19 agree that the conditions were set forth correctly. The merchants generally were very willing to talk, but they were unwilling that their identity should be disclosed. Manufacturers were also inclined to adopt a similar attitude, although some of them did consent to having their names mentioned.

JITNEYS HAVE INJURED TRADE

The merchants are sure that the jitneys have hurt their trade. It had been suggested from an outside source that perhaps the buying movement in Bridgeport had fallen off on account of a general slump in trade, but the quietus was given to this by a merchant who proved that some of his charge customers were opening accounts elsewhere, notably in New Haven, and in some instances in New York. Here is how a merchant employing 500 people summarized the situation:

The jitneys are not desirable for the shopper. They are not as commodious as the trolley and the drivers object to bundles. Factory people seem satisfied with the quick service which the jitney renders. Customers complained by letter of their inability to shop conveniently. Finally the company agreed to take telephone orders. This is a practice it had steadily sought to discourage because telephone orders run up delivery costs. There has been no appreciable increase in lateness. Jitney service in the morning seems to be adequate. Employees have complained, however, about difficulty in getting home at night. People on the outskirts find transit difficult. The attitude of the trolley company is wrong.

A merchant with 100 employees said in substance:

The loss of the trolleys has certainly hurt trade. The present nondescript bus service doesn't appeal to the better class. The buses move faster, but the annoyances to which one is subjected in traveling in them more than outweighs the advantage of speed. Factory men have agreed in a straw vote that the jitney was the thing, but sentiment is changing, due to the pressure of the women members of families who object to riding in the public autos. The jitneys have done better than I expected they would. The city has undoubtedly suffered in the past because of inadequate

transportation. The bus and the trolley services should be co-ordinated. If the matter had been put to a vote when the trolleys were withdrawn 90 per cent of the people would have favored the jitneys. Sentiment, however, is gradually changing.

Another merchant with 450 employees said he was sure the all-jitney service had hurt trade. He cited the credit instances referred to previously. In substance he said:

MID-DAY JITNEY SERVICE POOR

Jitney service is poor in the middle of the day. Both the jitneys and trolleys are needed. There should be trolley service from each end of the city with a loop in the central district, and a charge should be made by the railway for a transfer that will carry passengers from one end of the city to the other. Lateness is "a state of mind." Those who have been late on and off for years still come in late. The jitneys have made few recruits in this respect. The trolley had reached a low estate. It had not met the local needs. Since the trolleys were withdrawn this house has advertised the fact that telephone orders will be accepted. Mail order business has been solicited recently.

By careful study this man was able to estimate probable sales within 5 per cent. For reasons of his own his July and August budgets had this year been bunched, but receipts were running 25 per cent behind the estimate. The big falling off had occurred since the trolleys were withdrawn.

Another merchant employing sixty-five people had recently had two very big weeks. He said substantially:

Our good record was due to large advertising of our anniversary sale. The best trade will not ride in the jitneys. The trolleys are needed. There is no doubt about that. They have not, however, fully met the transportation needs of the community.

A plant in the outlying section employing 2,500 to 3,000 people, mostly women, was visited. The trip out there was made by jitney just after the noon hour. Bus after bus passed fully loaded. Finally one was boarded on which it was possible to obtain standing room. The ride was made at great personal discomfort to the writer. Standing in a trolley car is one thing. Standing in a jitney is something entirely different. The speaker at the plant visited was the supervisor of employment. He was suggested by the head of the company as being better informed, perhaps, than anybody else. He said:

NEITHER SERVICE ALONE SUFFICIENT

Two jitney lines run near the plant. There has been no noticeable increase in lateness on the part of the employees since the jitney has been the only means of service. The workers took "pot" luck in getting home. In this respect neither the jitneys nor the trolley has met the demand of the employees for adequate transportation. We should have the trolleys back, but the trolley and the jitney service ought to be co-ordinated. A more intelligent attitude on the part of the trolley management is needed. The trolley company was certainly behind the times in the accommodations it offered.

E. Norton, manager of the Connecticut Clasp Company, did not object to the use of his name. The plant of which he is the head employs only seventy-five people, but he had given considerable thought to the matter of transportation. His sympathies were decidedly with the trolley company. Mr. Norton knew costs. His brief talk showed this. His help was getting

twice as much as before the war. Practically all commodities had doubled in price and he thought that the trolley was entitled to the advance in fare which had been put into effect. He also thought the present jitney service was doomed. He said, however, that he would like to see a well regulated jitney service installed to supplement the railway. Bridgeport was a working-man's town and the traffic peaks were unusually severe. He did say, however, that his help appeared to be handled just as expeditiously as before the trolleys were withdrawn.

NONDESCRIPT SERVICE UNSATISFACTORY

The employment head of another plant with 2,500 persons said that there had been no general complaint of lateness on the part of employees since the trolleys had been withdrawn. He patronized the jitneys himself. Women at the plant had complained of crowding. He regarded most of the drivers as not qualified for their jobs and said they were not the type of men whose appearance inspired confidence. Weather conditions had favored the jitneys. He doubted whether they would be able to keep up the present pace under conditions of climate less favorable.

The welfare superintendent of a plant employing 1,500 said the proportion of those arriving late had increased slightly since the trolleys had been withdrawn. The service to the west end where this plant is located had not been satisfactory and it had been necessary to jack up the jitney association in the matter of service. The speaker used his own auto in travelling to and from work.

In the case of a plant employing about 2,000 the welfare superintendent said that most of the employees lived within walking distance. He was not optimistic as to the future of the bus service as at present managed.

Personal observation on the part of the writer established, so far as a limited survey could, the fact that service by jitney in the morning was fairly reliable and satisfactory. Conditions in the middle of the day, in so far as they come to the attention of the writer, were intolerable. In this regard they substantiate the claims of the merchants that women shoppers of the class upon whom the merchants are mainly dependent for their sales are conspicuous by their absence. Conditions in the evening are deplorable. Mr. Schwartz, the head of the jitney men, ascribes this to the fact that the general hour for closing in Bridgeport is 5 o'clock and that transportation must be furnished at one and the same time for shop help, employees of the stores and for the bulk of the traders who do their shopping down-town.

POLICE RETICENT

The superintendent of police refused absolutely to discuss the jitney problem. Personal observation established the fact, however, that a very efficient traffic system has been worked out, five policemen being used at each of several

of the important crossings during the rush hours. The system reflects great credit on Traffic Superintendent Walker.

Mr. Schwartz, who heads the jitney men, has lived in Bridgeport many years. He was formerly a mechanic in one of the shops there. He is now in the auto business with his brother. Literally and metaphorically he is the hardest man in Bridgeport to find. Interviewed after the rush hour peak on Aug. 19 he said there were 425 jitneys, each seating from twelve to sixteen persons. This is about the same number as before the trolleys were withdrawn.

With the trolley cars out of the way, however, the service had been speeded up greatly so that in the matter of accommodations conditions were improved considerably. Few buses run all night. Regular service commences at 5:30 a.m., and continues until 1 a.m., with a decreasing number of cars during the middle of the day and in the evening. Runs are assigned with the mutual consent of the bus drivers. Mr. Schwartz looked upon the withdrawal of the trolley service as an attempt on the part of the Connecticut Company to discredit the buses by proving their inability to cope with the traffic situation which the withdrawal of the trolleys created. He was sure that in this the Connecticut Company had failed. The bus men have plans of their own for organizing service or services with autos more commodious than those now in use, but funds for carrying out such plans can not be raised until the rights of the jitney have been properly established by suitable ordinances and at law.

BRIEF NOTES ON OTHER CITIES

In the other cities in the state the jitney menace has taken on other and varied aspects. If a proposal made by Thomas F. Moore, secretary of the Chamber of Commerce of Waterbury, is adopted, the city will rely solely upon the trolley. That body, through its transportation committee, has just filed an elaborate survey of the local situation with the Board of Aldermen, who have adopted the recommendations and passed an ordinance restricting the jitneys from operating on streets now served by the electric railway.

As far as the city of New Haven is concerned representatives of the Connecticut Company and of the jitney operators were heard there recently by the Board of Aldermen. The committee of that body will consider the facts brought out at the hearing and then draw up a report for presentation to the full body.

Two reports on the jitney have been made to the aldermen of Hartford. Both have been referred back to the committee of that body for further consideration.

The statement was made in one of the New Haven papers a few days ago that the Connecticut Company proposed to engage extensively in the jitney business, but this President Storrs of the company denied.

Traffic Moving Faster

Anti-Parking Legislation Has Marked Effect on Electric Railway Service in Kansas City

Beneficial results have followed the enactment by the City Council of Kansas City, Mo., of an ordinance regulating the parking of vehicles within the downtown business district. The measure was passed late in May. Patrons of the Kansas City Railways now find that their daily rush-hour trips are shorter by from ten to fifteen minutes than formerly. More time is saved owing to the shorter headway under which the cars are run.

RUSH-HOUR PARKING BARRED

The parking ordinance provides that vehicles shall not be permitted to stand on any of the main streets in the business section between the hours of 7 a.m. and 7 p.m., except for such time as is necessary for the reception and discharge of passengers and freight. This section, in general, includes the territory bounded by Seventh Street, Thirteenth Street, Baltimore Avenue and McGee Street, making the district approximately six blocks north and south and five blocks east and west.

The parking law partially eliminated the causes for delay and congestion, but affected the situation very little during the morning and evening rushes. The great number of jitneys stopping every block to take on and unload passengers caused much more inconvenience and jam than all of the other steadily moving traffic put together. In an effort to remedy the situation the City Council recently passed an ordinance routing the jitneys so as to circle the congested district. All jitneys are now moving north on McGee Street to Seventh, west on Seventh to Baltimore Avenue, south on Baltimore Avenue to Thirteenth Street and east on Thirteenth. It has been estimated that this relieves from 35 to 50 per cent of the congestion.

MR. BUFFE PLEASED

In commenting on the effects of the new legislation, F. G. Buffe, general manager of the Kansas City Railways, said:

MORE CAR RIDERS

The combined effect of the parking and loop ordinances has made a marked difference in the quality of service which we are able to give. We find that all cars are running on schedule and that we are maintaining our headways on time, where it was almost impossible before to get a car through. Our speed has increased more than 100 per cent, and although it is too early to estimate with a very great degree of accuracy, it looks as though our receipts were going to give favorable indication of the change.

There is not as much use of the private automobile as formerly, as many are leaving them at home rather than go to the trouble of observing the parking regulations, and the jitneys have felt the effect of the "loop" in a falling off in the number of patrons. People are unwilling to walk farther to take a jitney or a street car when operating under normal conditions.

Efforts are being made by the Kansas City Jitney Association to have the "loop" ordinance repealed and a substitute measure introduced.

Minneapolis Fares Up

**Ordinance Granting Company a Six Cent Fare Becomes Effective—
St. Paul Men Plan Strike**

An ordinance granting a 6-cent fare to the Minneapolis Street Railway took effect on Aug. 16. The measure was passed by the City Council on Aug. 6 and became a law without the signature of Mayor Meyers. The company accepted the ordinance on Aug. 13. Tickets are to be sold at convenient places, such as drug stores, but not on the cars. On Dec. 15 the fare will advance to 7 cents with six tickets for 25 cents.

The trainmen of the St. Paul City Railway served notice on the City Council that unless the Council took immediate action to increase fares they would strike at 5 a.m. on Aug. 21. E. W. Bemis has been wired to come from Chicago to make some sort of a report on the progress in the physical valuation of the company's property to determine whether an advanced rate of fare is warranted. The company will endeavor, in case of a strike, to operate the cars through voluntary service.

MINNEAPOLIS WALKOUT AVERTED

Had the Mayor vetoed the bill the trainmen's strike set for July 1, but postponed through formation of an arbitration board, would have been effective on Aug. 14. As it is employees of the company are to receive back pay from July 15 on the basis provided by the arbitrators. This means that about 2,000 men will get about \$65,000.

Horace Lowry, president of the company, said:

We expect to fulfill every promise to the arbitration board, the Council, city officials and the public. The time required to restore the 1917 service, in accordance with the provisions of the arbitration board's report, will depend entirely upon how soon we are able to fill up the ranks of our employees. We are beginning under a handicap because we are already short of the required number. We are hopeful however, that the new wage schedule will promptly furnish more employees, and these will be put to work re-establishing the service.

Under the new schedule the men instead of working on a ten-hour basis will work nine hours. They will receive 60 cents instead of 50 cents as maximum hourly pay, will obtain back pay for thirty days, will be allowed twelve holidays with pay each year and will be paid 70 cents an hour for overtime. Forty per cent of the shifts will be completed in eleven hours, 20 per cent in twelve hours and 40 per cent in thirteen and one-half hours. The men will be paid \$5.60 a day for nine hours hereafter, while heretofore they received only \$5.17 for ten hours.

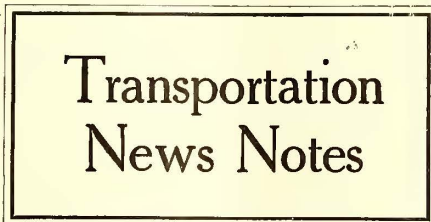
Bus Franchise Sought in Tacoma

Representatives of a new company of bus drivers have asked the City Council of Tacoma, Wash., for a franchise to operate over the city streets. Four men plan to form a concern, capitalized at \$40,000 to \$50,000, to operate a number of twelve to twenty passenger

buses on from two to four main arteries of the city.

In return for a franchise which will free them from cut-throat competition, the new company will guarantee fixed service in heated, pay-as-you-enter cars. Cash fare will be set at 10 cents with tickets at a lesser figure. To enable them to finance the proposition the City Council will be asked to give a franchise for a number of years.

Mayor Riddel and Commissioner Shoemaker state that no wild-cat jitney system will be tolerated. Bus drivers will be required to be bonded. A definite system of operation will be outlined before the cars are allowed on the city streets.



Ask Ten Cents in Berlin.—The Berlin (N. H.) Street Railway has applied to the New Hampshire Public Service Commission for authority to charge a 10 cent fare. The company proposes to sell twelve tickets for \$1.

Fare Raised in Augusta.—The Maine Public Utilities Commission on July 29 granted authority for a 9-cent cash fare or six tickets for 50 cents to the Androscoggin & Kennebec Railway, Augusta. The company had petitioned for a 10-cent fare.

Fare Advance Brings Revenue Rise.—The revenue of the Shawnee-Tecumseh Traction Company, Shawnee, Okla., has increased 25 per cent since the company began charging a 7-cent fare on June 1. The fare was formerly 5 cents.

Will Protect Carmen from Weather.—A bill has been introduced in the lower house of the Georgia Legislature requiring electric railways operating within the State to close in the ends of cars in winter to protect carmen from inclement weather. The proposed measure has been reported favorably by the committee on railroads.

Tokens on Georgia Line.—Metal tokens are now being used on the lines of the Augusta-Aiken Railway & Electric Corporation of South Carolina, Augusta, Ga. Fifteen tokens are sold for \$1.05 and thirty for \$2.10. The State Railroad Commission some time ago authorized the company to raise its cash fare from 6 cents to 7 cents.

Open Cars in Connecticut.—Open cars are again being operated on the lines of the Connecticut Company, New Haven, Conn. These cars were temporarily abandoned a year ago when the zone plan of fare collection was installed. Under the 7-cent flat fare regime now in force the use of this type of equipment is made possible once more.

Crosstown Fare 10 Cents.—The Massachusetts Department of Public Utilities has authorized the Union Street Railway, New Bedford, to discontinue the charge of 2 cents for each transfer. The company was given permission to charge a 5-cent fare to the center of the city and a 10-cent fare from one side of the city to the other.

Ten Cents in Regina.—Seattle is not the only city whose municipally-owned traction system has had to raise its fare to 10 cents to continue operation. The Regina (Sask.) Municipal Railway has been authorized by the Regina City Council to raise its cash fare to 10 cents and to sell two tickets for 15 cents, four for 25 cents and seventeen for \$1.

Six-Cent Fare Extended.—The Wisconsin Railroad Commission on July 31 issued an order extending the present fare charged by the Wisconsin Gas & Electric Company, Kenosha, until further notice. The present fare is 6 cents cash or nine tickets for 50 cents. The extension was granted after the company had showed operating deficits for April, May and June.

Asks Rise in Lake Charles.—The Lake Charles Railway, Light & Water Works Company, Lake Charles, La., has petitioned the Lake Charles City Commission for authority to increase its rates from 6 cents to 8 cents. Action by the commission has been deferred pending investigation of the company's earnings and valuation upon which such earnings are based.

Ten Cents in Findlay.—The City Council of Findlay, Ohio, on Aug. 10 authorized the Toledo, Bowling Green & Southern Traction Company, Findlay, to raise the fare on its local lines from 5 cents to 10 cents. The company had applied to the council for permission to abandon operation. This request was refused. The new rate will continue in effect for a period of two years.

Mayor's Absence Halts Fare Action.—The departure of Mayor Smith of Louisville, Ky., on a vacation trip to Colorado Springs has brought negotiations looking to a solution of Louisville's electric railway problem to a standstill. Members of the City Council say that the Council will take no action of its own accord and that the next step must come from the Louisville railway.

Bringing Home the Cost.—A new plan of publicity intended to show people how much it costs to operate and make repairs to physical property of an electric railway was recently tried out by the Toledo Railways & Light Company, Toledo, Ohio. A new section of curve construction at the corner of Summit Street and Jefferson Avenue, in the heart of the downtown district, bears a huge sign with the legend, "This cost the company \$35,000."

Regulate Davenport Buses.—The Board of Aldermen of Davenport, Iowa, has adopted a new jitney bus ordinance

fixing license fees at from \$10 to \$30 each vehicle and fares at 5 cents during the rush hours and 7 cents during other hours. The ordinance was drafted by the socialist administration as a weapon to fight higher street car fares, but the measure was unanimously adopted by the Council. A bond of \$1,000 must be filed for each car.

May Regulate Texas Utilities.—Governor Hobby of Texas recently appointed a committee to draft a public utilities bill for presentation to the State Legislature which meets in January, 1921. The proposed measure would create a State Public Utilities Commission with power to regulate the affairs of electric railways, gas companies and other public utilities. The committee consists of representatives of the Legislature, the utility companies and the state bar.

Quick Service to Beach.—As the result of persistent efforts which began early in 1912, the people of metropolitan Boston, comprising twenty-six cities and towns, have succeeded in procuring a rapid transit service to Revere Beach, the "Playground of New England." It is now possible to reach this famous seashore resort in nineteen minutes from Scollay Square, Boston, via the East Boston tunnel. Over this line the Boston Elevated Railway will operate cars direct to a loop on Ocean Avenue, Revere.

Wants More on Charleston Line.—Application was filed on July 30 with the Public Service Commission of West Virginia by the Charleston-Dunbar Traction Company, Charleston, asking increased rates on its city and interurban lines. The company would install a city rate of 6 cents and a zone rate on its interurban line of 7 cents. Its application states that it is unable to make operating expenses at present rates and that it has no funds for necessary improvements. The interurban line is divided into two zones.

Live-Stock Haulage Sanctioned.—With small-town and rural representatives voting against the larger cities, the Indiana House of Representatives has passed the Douglas bill authorizing interurban companies to haul live stock through the streets of incorporated cities. The bill is of particular interest to Indianapolis, where large shipments of hogs and cattle to the stock yards probably will result, the stock trains passing over the regular passenger lines and adding to the congestion, which already has proved a serious problem.

More Brooklyn Lines To Open.—Service will begin on Aug. 23 on two new extensions of the lines of the Interborough Rapid Transit Company, New York, N. Y., in the borough of Brooklyn. The new tubes are the Eastern Parkway Line extending from Atlantic Avenue to Flatbush Avenue and Prospect Park Plaza and then easterly through Eastern Parkway to Utica Avenue; and the Nostrand Avenue extension beginning at Nostrand Ave-

nue and running to Flatbush Avenue. During the rush hours trains will run every two and one-half minutes.

Want More in Everett.—George Newell, superintendent of the Pacific Northwest Traction & Power Company, Everett, Wash., appearing recently before the Everett City Commission in connection with a street paving project, stated that it soon would be necessary to ask for an increase of the 5-cent fare now charged on the city lines. He declared Everett was the only city in the State that had not raised its fare. Just what would be asked was not stated, but it was intimated that a rate similar to the 10-cent fare charged in Seattle is desired.

Interurbans Ask More.—The Louisville & Southern Indiana Traction Company, the Louisville & Northern Railway & Lighting Company, New Albany, Ind., the Indianapolis & Louisville Traction Company, Scottsburg, Ind., and the Interstate Public Service Company, Indianapolis, Ind. have presented petitions to the Indiana Public Service Commission asking for authority to increase passenger rates to a maximum rate of 3.6 cents a mile. The companies ask an increase of 20 per cent in baggage and milk charges. The basic rates now in force are 2½ cents a mile.

Ten Cents in Muskegon.—Muskegon, Mich., is now paying a 10-cent cash fare. The Michigan Public Utilities Commission recently issued an order authorizing the Muskegon Traction & Lighting Company to increase its fare from 7 cents to 10 cents for a period of sixty days beginning Aug. 1. Four tickets are being sold for 30 cents and children under five years of age are carried for 5 cents each. The commission held that it had no power to order jitney buses off the streets on which the company operates. Substantial increases in wages of employees were agreed upon by the company before the commission consented to the increased fares.

Will Abandon Freight Service.—Freight haulage in less than car load lots between Birmingham and Bessemer, Ala., and Birmingham and Ensley will be discontinued by the Birmingham Railway, Light & Power Company. Permission for the discontinuance of this service was granted by the Alabama Public Service Commission on Aug. 11. At a hearing early in the spring the commission denied the company the right to discontinue the service. The company showed that motor truck competition had so seriously curtailed its service that it was no longer profitable and was resulting in a heavy deficit.

Rerouting Plan Attacked.—Declaring that their business is being ruined as a result of the rerouting of the lines of the Los Angeles (Cal.) Railway, a petition signed by approximately 1,000 business men and property owners was recently presented to the Board of Pub-

lic Utilities of Los Angeles. In the petition the business men declare that property values along Broadway, Hill, Spring and intermediate streets north of Sixth Street have depreciated in value about \$40,000,000 during the past five years, and that the taking away of the customers who use the Western Avenue line is just one more move that will cause a further depreciation in property values.

Wants More on Auburn Lines.—To meet additional expenditures resulting from a recent increase in wages to its carmen, the Auburn & Syracuse Electric Railroad, Auburn, N. Y., has applied to the Auburn City Council to waive its franchise provisions limiting the rate of fare, so as to permit the company to petition the Public Service Commission for an increase in fare from 7 cents to 10 cents. The increased wages recently granted the employees of the system by a board of arbitration will add to the operating expenses of the railway the sum of \$90,000 annually. The company's income for the six-month period ending June 30, 1920, was less than the fixed charges and operating costs.

Eight Cents in San Antonio.—W. B. Tuttle, vice-president of the San Antonio (Tex.) Public Service Company, recently notified Mayor Bell of San Antonio that the company would raise its cash fare from 7 cents to 8 cents on Aug. 16. The company proposed to sell four tickets for 30 cents. In his letter to the Mayor, Mr. Tuttle stated that during the months of May, June and July the railway department operated at an actual loss. The deficit for May amounted to \$827, for June to \$3,085, and for July to \$247. On Aug. 1 the company installed one-man cars on the Tobin Hill—Prospect Hill line, which showed a deficit of \$1,500 for July. The company has thirty cars suitable for one-man use, twenty-eight of which are in regular service.

Five Cents a Mile Authorized.—The Charleston-Isle of Palms Traction Company, Charleston, S. C., has been authorized by the South Carolina Railroad Commission to charge a fare of 5 cents a mile on its lines. Under the new system many of the stations heretofore maintained are abolished, the company making stops each quarter mile. The company some time ago took action to raise its fare above the previous 3-cent limit, but was restrained by court order from doing so on the ground that a fare in excess of 3 cents a mile was prohibited under the State law. The company recently applied to the Federal District Court for permission to discontinue all service. It later asked the court to permit it to operate during a trial period of one year before rendering a decision.

May Ask Tulsa Rise.—To meet a demand of its employees for an increase in wages of 5 cents an hour, officials of the Tulsa (Okla.) Street Railway have announced that they may be forced to

ask the Tulsa city authorities for an increase in fare from 5 cents to 7 cents. The company entered into an agreement with its carmen in April, 1919, that it would increase their wages commensurately with the increase in the cost of living. Shortly thereafter wages were raised from 45 cents to 50 cents an hour. The men recently informed the management that the prices of necessities had advanced in a greater proportion than wages. The men produced figures showing an increase in the cost of staple groceries ranging from 20 per cent in the case of coffee, to 200 per cent in the case of sugar. Clothing for men and women has increased from 25 to 75 per cent.

Probing California Stage Lines.—A lengthy controversy of rights of the United Stages, Inc., to operate its auto stage service on lines extending over wide territory in Southern California is under investigation of the State Railroad Commission. A hearing was held by the commission on Aug. 9 following the receipt of many formal and informal objections to the operation, rules and certain practices of the auto stage lines and regulation for transfer of certain franchises. It is the contention of interests representing both competing auto stage and rail lines that the United Stages, Inc., and the Morgan Motor Company, which it later absorbed, were not operating as common carriers over certain portions of their present routes on or prior to May 1, 1917, when the present law governing operation of auto stages became effective and that it should accordingly be required to show the public necessity for its service.

Strike Threat Forces Fare Plea.—The receivers of the Manhattan & Queens Traction Corporation, New York, N. Y., have filed a petition with the Public Service Commission asking for permission to increase to 13 cents the fare from Manhattan via the Queensboro Bridge to Jamaica. The receivers notified the commission that the employees of the road had threatened to strike unless they received a 25 per cent increase in wages. The men have since walked out to enforce these demands. The original application for a hearing on the increased fare petition was filed by Walter B. Robinson, attorney for the receivers of the corporation, in September of last year. The Public Service Commission set the hearing for Sept. 9, when the city obtained an injunction preventing the commission from holding it. Justice Finch of the Supreme Court last October in a decision upheld the injunction, whereupon the company appealed. The Appellate Division of the Supreme Court affirmed Judge Finch's decision and the case was taken to the Court of Appeals. The latter court reversed the previous findings and the injunction was dissolved July 7 of this year. The men demand a wage increase of 11 cents to 13 cents an hour. The company has announced its willingness to grant an increase of 5 cents an hour.

Personal Mention

Toronto Transportation Commission Named

P. W. Ellis, George Wright and Fred R. Miller have been appointed by the City Council of Toronto, Ont., as a Transportation Commission to manage and operate the railway system of Toronto on the expiration of the franchise of the Toronto Railway in September, 1921.

In presenting the report of the Board of Control, Mayor Church made a strong plea for generous consideration of the recommendation. He said the Traffic Commission was to be a permanent body, and would start work at once. It was the most important appointment that had been before the members of Council in a long time. Toronto had embarked upon a public ownership policy, and it was therefore necessary that the men chosen to manage the railway system should be avowed public ownership advocates. Many names had been before the Board of Control, but he felt that he was voicing the sentiment of his colleagues on the board in stating that no three men could have been named who would have commanded more widespread support from the public and the press.

P. P. Crafts, until recently manager of the freight department of the Eastern Massachusetts Street Railway, has been appointed purchasing agent, succeeding W. C. Boldt.

W. C. Boldt, formerly purchasing agent and investigating engineer of the Eastern Massachusetts Street Railway, has been appointed superintendent of rolling-stock and shops, succeeding F. D. Ward.

George F. Williams, general superintendent of the Central Maine Power Company, Augusta, Maine, has been appointed general manager of the Androscoggin Electric Company, Lewiston, Maine, to succeed Frederick E. Gordon, resigned.

F. D. Ward, superintendent of rolling-stock and shops of Eastern Massachusetts Street Railway, Boston, has resigned to enter commercial work in China. Forty of his friends in the company gave him a send-off dinner at the Boston City Club on Aug. 11.

H. H. Norris, managing editor of ELECTRIC RAILWAY JOURNAL, has during the present summer made an extended tour through the Northwestern States and western Canada. He made a special study of electric operation on the Chicago, Milwaukee & St. Paul system, and investigated street and inter-urban railway conditions in Butte, Spokane, Seattle, Tacoma, Portland, Vancouver, Calgary, Winnipeg, Port Arthur and Fort William. He reports

a spirit of optimism regarding the prospects of the future of the industry and much activity in bringing rolling stock, track and buildings back to the pre-war standard.

Frederick E. Gordon, general manager of the Androscoggin Electric Company, Lewiston, Maine, has resigned his connection with that company to accept a position with the Cumberland County Power & Light Company, Portland, Maine. Mr. Gordon will be succeeded as manager of the Lewiston property, which comprises thirty miles of electric railway line in addition to a lighting and power system, by George F. Williams, who has been serving as general superintendent of the Central Maine Power Company, Augusta. Mr. Gordon has been connected with the Androscoggin system for a number of years and is regarded as one of the most efficient railway operators of New England.

Obituary

Russell A. Griffin, general sales manager of the National Pole Company, died of pneumonia July 14 at his home. He was for many years connected with the American Telephone & Telegraph Company, and later with the Western Electric Company before going into the pole business.

H. L. Gordon, superintendent of the northern district of the Philadelphia (Pa.) Rapid Transit Company, died on July 14. Mr. Gordon had been in the service of the company since 1893. In 1898 he was made a division superintendent. He assumed his duties as superintendent of the northern district on July 1, 1919.

Roscoe D. Smith, formerly general manager of the Illinois Traction System, Peoria, Ill., died recently. Mr. Smith was in charge of the affairs of the company during the construction period from 1905 to 1910. He later went into business as a railroad construction engineer with offices in St. Louis, Mo. He was fifty-four years old.

Jeremiah E. Reeves, seventy-five years of age, who owned a controlling interest in the Toledo, Fostoria & Findlay Railway, Fostoria, Ohio, died suddenly of apoplexy at his home in Dover, Ohio, on July 11. Mr. Reeves founded a sheet and tin mill at Dover which has developed into one of the largest in the country. He left a considerable estate in Toledo.

Manufactures and the Markets

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

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Commutator Segments in Normal Demand

Raw Material in Good Supply, but Transportation Is Delaying Deliveries

Manufacturers of commutator segments for railway motors report that sales are proceeding at about a normal pace but that demand is not extraordinarily heavy. These segments have probably been in a little heavier demand than usual as the result of necessary repairs to the many motors which were damaged by the severe storms last winter.

With the supply of copper in as easy a position as at present, raw material is not a question to worry producers especially, but considerable complaint is heard against transportation as a factor in lengthening deliveries, which are quoted by several representative manufacturers at from six to twelve weeks. These same companies report a normal volume of production that is gradually catching up with those orders which in some cases have fallen behind as a result of long deliveries. No orders have been canceled, however.

Labor troubles are here and there experienced, but as a whole the situation in that respect is considered good. Prices at present are steady, and while some companies look for further increases, those that think the market will remain firm seem to be in the majority.

Collections are rather slow and accomplished with difficulty according to the credit manager of one of the largest manufacturers of this material. Public utilities appear to be the worst delinquents in this respect, but with financial relief being more and more accorded in the form of rate increases improvement is looked for.

Railways Buying More Waste at Present

Closing of Textile Mills Is Seriously Cutting the Supply and Stocks Are Running Low

Waste manufacturers who sell direct to large consumers, such as railways, are meeting a very good demand for their product at present, although some producers who deal with jobbers say they are not finding a strong market in that quarter, due probably to uncertainties in the cotton and woolen market that may be causing distributors to hold off from purchasing.

As a matter of fact it is said that both steam and electric railways are

using more waste now than for some time past, about 60 per cent of the output of one of the large producers going to this market alone. It is also stated that the increase in freight rates has already considerably swelled the volume of orders, as steam railroads are anticipating their requirements by ordering ahead to insure an adequate supply of material for the additions they will make to their rolling stock. It seems reasonable to suppose therefore that purchasing agents of electric railways must reckon on this increased market competition in providing a sufficient supply for their own needs.

Even if demand increased to a much greater extent, however, this would not be a circumstance to cause any alarm under normal conditions. But just now the situation is far from normal with a severe shortage threatening if no relief appears in sight, and the question of relief will largely depend upon the action of the textile mills, upon whose output the manufacturers of waste are dependent for their production. In spite of the fact that raw cotton has been dropping in price under the pressure of plentiful supplies and lessened demand, the situation with regard to cotton waste has been growing worse. This is because the production of waste bears no direct relation to the supply of

cotton fiber, but is dependent instead upon the textile mills, which, as a by-product, turn out the material from which waste is made. There is an even greater dearth of woolen waste, as not only are many of the cloth manufacturers in that line closed down too, but the wool industry is in a condition approaching demoralization in the wool growing states of the Intermountain section.

Transportation delays have been adding their quota to the foreboding outlook, although some slight relief in that respect is reported now. Deliveries are an uncertain quantity, however, as no promises are made, but textile mills simply turn over raw material to the waste manufacturers as it becomes available and the latter in turn pass the goods on to their customers. In general, there are no stocks of the finished material, although in isolated cases producers report a fairly good stock through having supplies of material that were previously held at the mills unloaded on them. Prices have not increased materially, cotton waste being quoted at about 13 to 18 cents a pound and wool waste 13 to 22 cents a pound, according to grade. In some quarters, however, it is stated that an increase of about a cent per pound is expected.

Iron Wheel Market Shows Slight Improvement

Factory Stocks Low, but Deliveries Are Better—Transportation Is Chief Factor in Impeding Production

Electric railway buying of chilled-iron wheels exhibits a present tendency on the part of purchasing agents to place orders farther ahead than hitherto, although the amount of new business being handled runs along on an even keel. The greater part of the present business is renewal in character, and on representative orders a differential of about 3.75 cents per pound was recently quoted on 500-pound wheels. Factory stocks are pretty well cleaned out, except in cases where the contract between the railway company and the manufacturer provides for the continuous maintenance of a stated number of wheels in reserve stock subject to prompt shipment. Deliveries, however, are being quoted on a three to four weeks' basis, which is a great improvement over recent conditions.

In one particular case a large road recently ordered 5,000 wheels for replacement service, compared with a usual contract for 3,000. It is believed in some purchasing circles that no immediate changes in price are to be ex-

pected in wheels. One large manufacturer states that at present prices are about 50 per cent above the pre-war level. This concern put a 25 per cent increase into effect last winter, thereby advancing wheel quotations from an approximate 25 per cent sur-charge above the pre-war level. Following the signing of the armistice, wheel prices dropped off materially, but recent difficulties in securing raw material forced an advance. Labor is now in easier supply and doing somewhat better work than earlier in the year, so that if the transportation situation should be materially improved, raw material would flow into the factories in better volume and with greater punctuality, thus opening the way to increased production. The chances of early improvement in freight conditions, however, are not very bright. Fortunately, wheel factories are well distributed over the country, and the effect of local embargoes is thus minimized. A few days ago one factory had its outgoing shipments curtailed 50 per cent by the rail-

road system serving it, but it is not believed that this condition will last long. Gradually the resumption of rolling stock orders by the steam railroads is having its effect, and is expected to relieve the present uncertainties. Little night work is being done in the wheel factories, so far as can be learned. The price per pound of material represented by chilled-iron wheel quotations today compares very favorably with prices of other materials entering into car construction, and the present seems a particularly favorable time in which to order supplies of this kind.

No Favoritism in Allocating Supplies

Freight Embargoes Account for Some Sections Receiving More Material than Others

There is a feeling among some Pacific Coast buyers that manufacturers have been neglecting them in favor of Eastern firms, but an investigation shows that buyers in the East think it is they who are being discriminated against. During the switchmen's strike the East had some cause for complaint because the Far West received more than its share of electrical apparatus from Middle Western manufacturers for the reason that railroads would not accept shipments consigned to the East. Local buyers in cities where the factories are established also complain that others are getting more goods than they. However, no one in the field seems to have been able to obtain all the supplies that were needed, and this appears to have been at the root of the trouble rather than any discrimination in favor of or against any geographical group of buyers. Furthermore, there is every indication that deliveries in most lines are improving and that they will continue to grow better for some time to come.

Almost all the principal manufacturers of electrical apparatus allot a certain percentage of their output to each section of the country, and this allotment is based on the records of previous requirements. Every effort seems to have been made to treat all customers alike, and there has apparently been no idea of diverting shipments from representatives or customers on the Pacific Coast. During railroad embargoes, however, it is a case of making shipments according to the dictates of the transportation companies.

Electrification of German Railways Near Cities

According to the Bureau of Foreign and Domestic Commerce, coal as a power producer will be replaced so far as possible by the use of peat and the electrification of railroads in the vicinity of the large German cities. Great hopes are being placed on the new Theissen 10,000-hp. vertical gas turbine, two of which have been ordered for use on the German railways.

In regard to the electrification of the German railways near large cities, it is planned to install large central power houses, which will be equipped with peat-burning furnaces. The peat bogs in the vicinity of Osnabruck will furnish this fuel. Machinery for the working of this peat has been installed, and it is hoped that the first deliveries will take place by Sept. 1, 1920.

Orders for Fiber Conduit Booked Ahead

Output Inadequate to Meet Demand—Labor and Material Costs Increasing Prices

Buying of fiber conduit in the larger sizes has been very noticeable of late. Much of the material now going through and on order is of the 4-in. size, and some is going to 4½ in. In line with this there has been good buying of the larger sizes of lead-covered cable. At the same time it is known that as much duct ventilation as possible is desired.

Manufacturing output as a whole is booked up well into the last quarter of this year, October being well covered and much running into November. Here and there, however, a few small amounts may be taken care of late in September. At the same time, a good bit of business has been placed for 1921 delivery, and from the nature of the cable buying which has been going on this summer, it is rather expected that within the next few months fiber-conduit production will be well cared for for delivery running several months into the next year.

Demand is good all over the East and the Middle West, but there is not enough capacity to supply it quickly. The raw-material situation is in fair shape, but prices on pulp and compounds have advanced, along with the rates paid to mill workers all along the line to the finished conduit. Consequently, advances in price were made on the finished pipe during June and July, amounting to about 15 per cent. Labor is still unsteady and hard to obtain, and turnover is all too frequent. Because of this, considerably more attention is being paid to the inspection of the product in its various stages of manufacture, with a consequent higher cost of production. Extra night shifts are particularly difficult to get and to keep.

Export demand is good, but shipping rates are almost prohibitive. There is not enough fiber conduit made to supply both foreign and domestic trades, so the foreign allotments are liable to suffer.

Western Red Cedar Association Holds Annual Meeting

At the fifteenth annual meeting of the Western Red Cedar Association, held at Spokane, Wash., on July 30, nine companies were represented, including E. T. Chapin Company, Metropolitan Cedar Company, National Pole

Company, Northern Cedar Company, Sandpoint Lumber & Pole Company, Searl-Waterman Company, Valentine Clark Company and Western Lumber & Pole Company.

Reports of various committees were heard, and the advertising program of the association was discussed. The officers elected were: Morton Macartney, president, and E. A. Lindsley, vice-president, while L. L. Hill, H. J. Searl and E. L. Clark were renominated as directors to serve for one year with the president and vice-president.

Rolling Stock

Recent announcement that the Pacific Electric Railway was to spend \$1,400,000 for new equipment has been followed by orders placed during July for equipment which included forty-nine Birney type safety cars ordered from the American Car Company of St. Louis, Mo., and twenty all-steel multiple-unit cars for interurban service, equipped with motors for 600-1,200 volts automatic changeover. These new cars will be similar in design to twenty-four cars of the same type now in interurban service on the Pacific Electric Lines. The length of these is 58 ft. 1 in., the width 9 ft. 2 in., and the average weight of each car is 107,000 lb. without passenger load. Some of these new cars will contain compartments for smoking. This type of equipment is entirely a closed car and has no open section like some of the company's other interurban equipment. The order has been placed with the Pullman Company. This order also included ten all-steel cars of the same type as above but without motors, as they will be used as trailers in the operation of two, three or four-car interurban trains. The order for non-motor cars was also placed with the Pullman Company. Cars of this class contain thirty-two seats, thus accommodating sixty-four passengers.

Track and Roadway

Pacific Electric Railway, Los Angeles, Cal.—The Pacific Electric Railway has begun relaying the tracks of its East Seventh Street line, Long Beach.

Humboldt Transit Company, Eureka, Cal.—The Humboldt Transit Company is rebuilding 2,300 ft. of track on the route of a new highway. The construction is concrete with Warrenite top.

Pacific Electric Railway, Los Angeles, Cal.—The Pacific Electric Railway has been granted an extension of forty-five days in which to complete its track laying on East Colorado Street between the Santa Fé track and Los Robles Avenue. Under the provisions of the ordinance the company has 180 days from April 1 last in which to lay its new tracks on East Colorado Street from Los Robles Avenue to a point 200 ft. east of Mentor Avenue. The company is considering a plan for a sub-

way from the Hill Street station to Figueroa Street and then to Vineyard Junction.

Interstate Public Service Company, Indianapolis, Ind.—High-tension electric current from Jeffersonville to Indianapolis was turned on a few days ago by the Interstate Public Service Company, which operates the lines of the Louisville & Northern Railway & Lighting Company as far north as Sellersburg, Ind., and the lines of the Indianapolis & Louisville Traction Company from that point to Indianapolis. All the current will be supplied from Louisville and Indianapolis. There will be a standard voltage, 600, from Jeffersonville to Indianapolis, instead of 1,200 volts from Sellersburg north.

Middlesex & Boston Street Railway, Newtonville, Mass.—The Middlesex & Boston Street Railway has refused to change the grade of tracks on Crescent Street, and as a result the city is forced to suspend the rebuilding of Crescent Street.

Springfield (Mass.) Street Railway.—The Board of Aldermen of Springfield has received five petitions from the Springfield Street Railway asking the right to locate and relocate tracks for proposed improvements in the East Springfield district.

New York & Queens County Railway New York, N. Y.—The Public Service Commission of the First District has notified W. O. Wood, president of the New York & Queens County Railway, that it must rebuild its tracks in Main Street, Flushing.

Public Service Railway, Newark, N. J.—The State Board of Public Utility Commissioners has issued an order granting permission to the Public Service Railway to change the Sixth and Eighth Street line in Camden and the Borough of Woodlynne. The company will divert the route from Ferry Avenue to follow the line to Haddon Heights, N. J., and will install a crossover to provide for turning cars on the outskirts of the town.

Muskogee (Okla.) Electric Traction Company.—Officials of the Muskogee Electric Traction Company announce that, when the viaduct over the Missouri, Kansas & Texas tracks has been repaired, double car tracks will be laid across the viaduct.

Dallas (Texas) Railway.—The Dallas Railway will be asked to extend the tracks of the State Street line from State Street to Haskell Avenue and along Haskell to Cole Avenue. This improvement will be necessary because of the erecting of the new North Dallas High School Building.

Houston, Bayshore & Texas City Traction Company, Houston, Texas.—The Houston, Bayshore & Texas City Traction Company has petitioned the City Council for the right of way over certain streets within the city limits. The proposed line is to begin on Polk Avenue and cross Telephone Road.

Franchises

Los Angeles (Cal.) Railway.—The Los Angeles Railway has applied to the City Council for a franchise to construct, operate and maintain a double-track electric railway in South Park Avenue, Los Angeles.

Webster, Monessen, Belle Vernon & Fayette City Street Railway, Charleroi, Pa.—This company has been granted a franchise to construct an electric line in Schoonmaker Avenue, Tenth Street and other thoroughfares in the borough of Monessen.

Power Houses, Shops and Buildings

Humboldt Transit Company, Eureka, Cal.—The Humboldt Transit Company has installed a 300-kw. rotary converter.

Los Angeles (Cal.) Railway.—A building permit authorizing the construction of a \$550,000 terminal for the Los Angeles Railway at the northeast corner of Eleventh Street and Broadway, Los Angeles, has been issued from the office of the city building inspector. The structure will be 130 ft. in height, containing ten floors, and will be constructed of reinforced concrete. The executive offices of the company will occupy the four top floors, the remaining part of the building to be leased out for office purposes.

Trade Notes

The Sanford Riley Stoker Company announces the removal of its Worcester (Mass.) office from 25 Foster Street to 9 Neponset Street.

The Ohio Electric Controller Company, 6900 Maurice Avenue, has awarded contract for erection of an addition to its factory, to cost about \$60,000.

The Electric Controller & Manufacturing Company, 2700 East Seventy-ninth Street, Cleveland, Ohio, has opened a new office in the Witherspoon Building, Philadelphia, in charge of H. K. Hardcastle.

The Locke Insulator Manufacturing Company, Victor, N. Y., announces the resignation of B. A. Plimpton, sales manager, effective Aug. 15. For the present his duties will be taken over by D. H. Osborne, acting sales manager at Victor, N. Y.

Ralph B. Coleman, formerly of the Chicago offices of the Maloney Electric Company, has joined the sales forces of the Consolidated Wire & Machinery Corporation, 519 West Van Buren Street, Chicago. Mr. Coleman has been in the West for the past twenty years and has a wide acquaintance among central-station men in that section.

L. F. Rurey, formerly in charge of the electrical department of the George

H. Smith Steel Casting Company, Milwaukee, Wis., has been appointed electrical superintendent for the Milwaukee Rolling Mills Company, which was organized about a year ago. Mr. Rurey has been engaged in electrical maintenance and construction work for the past ten years.

Edward W. Harry, electrical engineer of the National Tube Company, McKeesport, Pa., left the electrical department on July 17 to become chief electrical engineer with the Pittsburgh Steel Company at Monessen, Pa. Mr. Harry started with the electrical department in 1910 as a lineman and while there took a course in electrical engineering in the Carnegie Institute of Technology, from which he was graduated in 1915.

The Porcelain Insulator Corporation, Lima, N. Y., recently incorporated with a capital stock of \$250,000, is planning to erect a new plant on the old site of the plant of the Locke Insulator Manufacturing Company, which was destroyed by fire more than a year ago. The new company will manufacture high-voltage porcelain insulators and electrical appliances, starting with a four-kiln capacity. It is expected to have the plant in operation by January, 1921. W. F. Harvey is president, D. H. Finucan vice-president, B. A. Plimpton secretary and V. E. Taylor treasurer.

New Advertising Literature

Valve-Closing Device.—The Cutler-Hammer Manufacturing Company, Milwaukee and New York, has issued an illustrated leaflet entitled "Extension to L Street Station, Boston," in which a brief description is given of the Dean control.

Conduits.—The Garland Manufacturing Company, West Pittsburgh, Pa., is circulating two small leaflets, one entitled "Galvaduct" (galvanized) "Loricated" (enameled), covering its rigid conduits, and the other entitled "Sterling Flexible," describing its flexible armored conductor.

Waterwheels and Governors.—The Holyoke Machine Company, Worcester, Mass., has issued catalog No. 13, covering its different types of Hercules turbine waterwheels, and also a small booklet entitled "The Improved Governor," in which it describes its new governor for waterwheels.

Air Compressors and Pumps.—The Crowell Manufacturing Company, 298 Taaffe Place, Brooklyn, N. Y., is circulating two leaflets covering its type "A" and type "B" positive pressure blowers or rotary air pumps and type "D" rotary air compressors or vacuum pumps.

Voltmeters and Indicating Meters.—The Roller-Smith Company, 233 Broadway, New York City, has recently issued bulletin No. 150, covering its small portable type H A voltmeters, ammeters and indicating wattmeters for alternating current.