

# Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW



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## Mr. McAdoo Favors Electrification, but Not Now

PUBLIC interest was stirred this week by some remarks on the desirability of steam railroad electrification, erroneously attributed in the daily papers to Director General McAdoo. His real position is set forth in a brief statement which he has given to the JOURNAL for publication. He very properly holds that in the present circumstances, with the tenure of government control indefinite, any extensive program for electrification cannot properly be taken into consideration. This policy is a logical one. The immediate object of this nation is to win the war, and while electrification would help, the expenditure of the same amount of money and energy in equipment which can be used by our men at the front would probably bring quicker results. But in the general scheme of conservation which must follow the war, electrification must have an important place, and here, as abroad, it is none too early for the formulation of large plans for the early future, when reconstruction will make enormous demands upon our resources. Had electrification been generally undertaken ten years ago we would be in a much better condition now from a transportation standpoint than we are. Our plans should be ready to begin the work, just as soon as our factories and men can turn from the arts of war to those of peace.

## The Seatless Car Idea Looms Up Again

IN THE ISSUE of this paper for Aug. 10 we published a plan of a so-called "seatless car" which is being tried out in service in Rome, Italy. Inquiry among transportation engineers develops the fact that the idea is not entirely novel and that it has had some serious consideration in New York City during the period just prior to the present war. Such study as was given to the idea was solely along the line of relief of congestion and rapidity of loading at terminals and transfer points. There was naturally no thought at the time of the present situation as to shortage of man power. The idea was abandoned largely because of the fear that the public and the regulating commissions would not take kindly to any suggestion which would be so directly opposed to the "seat for every fare" slogan.

The shortage in man-power has crippled the railways so much that any plan to increase the carrying capacity of city cars, especially during the rush hours, deserves consideration. A simple computation shows that the average 45-ft. cross-seat surface car will seat about forty-eight people and carry about thirty-three standees comfortably, giving a total of eighty-one passengers. However, with the car thus filled the average speed

is reduced greatly, due to delays in loading and unloading. The same car with all seats removed would carry 100 people all standing, if an average of 2½ sq.ft. of space be allowed for each person, and they would not be crowded as closely as the eighty-one people were in the car having seats. This provides for an increase in carrying capacity of more than 23 per cent, with no increase in operating charges except possibly for power.

The public has generally become used to the "standing room only" idea under very trying conditions during rush-hour travel. Practice has even shown that where the ride is not a long one, most people would rather stand in the first car at hand than wait for an available seat in the car following. All students of transportation have observed this fact.

We would not be understood as recommending the plan except in an emergency and where the run was a short one. But in these times when every plan for reducing expenses must be considered, it is well to remember what the public has accepted for tramway service in the country of one of our Allies.

## Will the Use of a Cushioned Gear Reduce Friction Losses?

THE power loss in the gearing between the railway motor and the car axle which it drives has always been a source of regret to the equipment engineer, who instinctively dislikes to see good coal thus wasted. Car gearing operates under such unfortunate conditions that we have all assumed that if the teeth were properly designed to work together and to withstand the stresses, if the gears were properly lubricated, if the distances between centers were properly preserved and if grit were excluded from the gear case, we had done about all that was humanly possible under the circumstances. Even under these conditions the losses constitute too great a part of the total, especially at times of light load. Now an engineer, G. W. Remington, comes along with the suggestion, based upon extensive study and experience, that much of this friction loss is caused by vibration and that this vibration might be at least partly eliminated. The natural way out, he thinks, is to use a cushioned gear. Such gears are not novel in electric locomotive drive, but the cushion used generally for this purpose has been the coiled spring. This, Mr. Remington thinks, would not be satisfactory on electric cars. He prefers rubber, and has been assured that oil-proof rubber cushions can be had.

We hope that the publication of an article by Mr. Remington on the subject of cushioned gears, in this issue of the ELECTRIC RAILWAY JOURNAL, will lead to a trial of this scheme.



## Special War Traffic Is Costly to Handle

**O**BSERVATION of the way electric railways are handling shipyard, munitions and camp traffic indicates that they have been obliged to muster what facilities they could and trust to luck to handle the business and to make a little money. As it has been out of the question to get new cars quickly, the veterans of past decades have been refurbished and cars have been bought or leased from railways whose traffic has declined since the war began. The result on some lines is a truly astounding conglomerate.

The best that can be done by most railways is to run motor and trailer combinations. Even these mean high platform expense in the many cases where the business is simply of twice-a-day character between the city and some distant workshop. Fare collection is another fright at many places, the cars being boarded in such a reckless way that the conductor cannot reach all the passengers.

In reality the ideal way of carrying such travel is with special locomotive-handled trains to the distributing center of the city, thereby keeping down the platform expense; and the ideal way of getting the money and relieving the conductor is through prepayment areas with motor-driven coin boxes or registers. Otherwise, we fail to see how many companies can break even, for there is not much nourishment at present costs in building track, line and substation for cars which make only two trips a day, one in the morning and the other in the evening, and run empty for one way of each of these trips.

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## A Useful Series of Articles on Electric Railway Rolling Stock

**I**N THIS ISSUE of the ELECTRIC RAILWAY JOURNAL is the conclusion of a series of seven articles on the design and construction of car bodies and trucks, written by Norman Litchfield. We hope that later he will prepare a supplementary series on maintenance in this same field. Meanwhile it will be well for all of our readers who have to do with the purchase, maintenance and operation of electric railway cars to study this series as a whole in order that they may be able to do what they have to do more intelligently.

In order effectively to handle this subject, Mr. Litchfield has been obliged to go somewhat into the subject of mechanics, which is, of course, the basis of all engineering design and construction. In some cases he has had to assume a certain amount of knowledge of mechanics on the part of the reader. The purpose of the series, however, was not to go into refinements of design which would appeal only to the car-body or truck expert, but rather to point out those principles which should be understood by general managers, equipment superintendents and employees generally who hope eventually to attain to positions of greater responsibility than those that they now occupy.

There is a certain tendency among many to "shy" at mathematics or mathematical-looking diagrams, in the prevalent but mistaken fear that these can only be understood by the initiated. Mathematics, however, is the basis of all safe and sane business, and it is only when it takes algebraic form that it appears

formidable. In this series Mr. Litchfield has avoided the use of all mathematical "frills" and has used only that theory which is essential to his line of thought. He has, we believe, made a notable contribution to the literature of his subject.

Now that the series is complete we urge again a review of the seven articles as a whole, and it will be a mighty dull reader who will not find a little effort put upon such a review of very great value in his work.

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## How the War Has Affected Railway Traffic

**T**HE effect of the war on increasing the operating expenses of electric railways and thus necessitating a higher fare are pretty well understood now by the public, but a great many people do not yet realize that many of the railways are not carrying anywhere near so many passengers as formerly. We say many of the railways because on some lines, especially those near cantonments, shipbuilding plants and munition work, the traffic has increased. This makes difficult any general summary of the situation, either as to cause or effect. Where the fare has been increased, it is a popular theory to attribute the diminution of traffic entirely to that cause. But we believe that much of it in many cases would have occurred in any event.

One reason, of course, is that a considerable proportion of the men between the ages of twenty-one and thirty-one have left to enter military service. These men in their home town are usually liberal spenders, at least for local transportation. As a rule, they are earning good wages and like to ride to and from their work as well as use the cars for trips in the evening and on holidays. The subtraction of say 5 per cent of the population of a town is bound to have an effect on electric railway travel, but when this percentage represents the most active part of the population, the effect is bound to be larger.

Another important cause of reduced traction earnings, in the opinion of many railway men, is the conservation and savings campaigns being followed in all parts of the country, especially that of the purchase of Thrift Stamps. No railway man would discourage this campaign, but it undoubtedly has had an important effect on electric railway earnings. The principle preached is the saving in different ways of small amounts for the purchase of Thrift Stamps, and the easiest way that many can save five nickels is by walking five times instead of riding on the street cars. The campaign in the public schools for Thrift Stamps has undoubtedly been the means of diverting many nickels from the railway company to the government.

The third cause for reduced traffic is that partly through shortage of labor and partly in their efforts to economize, many companies have reduced their service. Headways have been lengthened from three minutes to five minutes or from five minutes to seven and one-half minutes, etc., and this has naturally resulted in a further loss of patronage.

Where there has been an increase in fare, there has also undoubtedly been some effect on traffic, but for the reasons outlined we do not believe that all of the decrease in traffic can be attributed to an increase of fare



## Depreciation Must Be Recognized, But the Public Must Pay for It

ADEQUATE allowance should be provided for electric railway depreciation. Adequate provision should also be made for the electric railway earning power necessary for sound credit. These are not new doctrines, but we direct attention to one phase of them which is apparently not soundly considered—that is, their relative importance.

What should be done when revenues lag behind costs so that full provision cannot be made for both depreciation and a fair rate of return to investors? There is no reason for entering upon an academic discussion of what is the priority between these two items, and whether the public prefers an insolvent railway in first-class physical condition or a prosperous company with more or less deteriorated property. The vital point is simply this—in the case of revenue deficiency, should it be assumed that it makes no difference how much the security holders, or in practice the stockholders, suffer if only the commissions' ideas on depreciation are enforced?

This point is not theoretical. It has a practical bearing in New York State at this very moment. The situation there is briefly this. In 1912 the First District Commission promulgated an order requiring a monthly allowance of 20 per cent of the operating revenues for maintenance and depreciation. After a long legal battle the highest State court has now held that the regulatory law does not grant to the commission the authority to make such an order. The same court, it will be recalled, has also ruled that the public service law has conferred upon the commissions no power to raise franchise rates, regardless of the cost of operation.

In the face of this situation, the Second District Commission, which has under way a revision of its accounting rules, as previously noted in these pages, is "suggesting" to companies that between 2 and 5 per cent a year on the cost of way and structures and between 2 and 10 per cent for equipment will generally be less open to question than depreciation rates outside of these limits. Each company may determine its own depreciation charges, of course, but the commission will follow the above stated policy in passing upon the adequacy or inadequacy of such charges in rate and other cases.

The Second District Commission is undoubtedly actuated by the most sincere motives, and we know that it feels as much concerned about the credit of the companies within its jurisdiction as it does about depreciation. But the duty of both commissions in New York, to the railways and to the public, demands that the situation be handled in a larger way. Both depreciation allowances and a proper return to investors are absolute necessities, but they require adequate fares—these are fundamental.

What is needed, therefore, is a redrafting of the regulatory law. If the commissions are to establish depreciation rates, they should have power at the same time to increase rates. Commission regulation of depreciation accounting, combined with the present hit-and-miss system of commission and municipal rate-making, would be most inequitable. Justice lies only in *simultaneous* amendments covering both depreciation and fares.

Even then, the commissions should realize that the

proper allowance to be included in present-day operating expenses for insuring the future replacement of physical property is one still largely of conjecture and opinion. Hence there should be some range for the exercise of judgment on the part of those charged with the responsibility of conserving the physical and financial integrity of the properties. In the past the companies probably advocated lower rates than the commissions approved, but the conditions might easily be reversed. For instance, with falling prices of labor and supplies the companies might argue for a high depreciation charge so as to keep the fares up, while a commission might urge a lower charge to permit a reduction in fare.

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## Can Further Economies in Car Heating Be Introduced?

THE utilization in winter for car heating of the heat dissipated in grid resistors and motors has been considered many times by various railroads. The amount of heat that could be thus obtained has been found to vary widely with the character of service, the manner in which the motorman handles his car, the speed, the windage and other variables, which make the utilization of this heat a discouraging proposition. In another part of this issue is an article giving some results of tests made to determine, if possible, just how much of this waste heat could be utilized without excessive cost for car changes. Some results and suggestions are also given for smoothing out the peak loads during rush hours by interlocking the regulation of the car heaters with the control equipment, so that current can be used for heating the car only during the periods of coasting, braking and stops. The value of this smoothing method will increase as the number of cars in operation is decreased and should be of greatest value to small systems. This heating peak amounts to as much as 30 per cent in some cases, and as the top of the peak costs most, this represents more than that percentage in actual cost in and the amount of fuel used. From the data which we have been able to collect, it is evident that a full equipment of car heaters is necessary to provide for extreme conditions and that a full utilization of any other sources of heat can be obtained only by the use of thermostatic control for regulating the heat supplied by the electric heating equipment.

No doubt many tests and trials similar to those given have been made by other roads of which we have no knowledge. It is the hope of the editors that this article will open up a discussion which will supply data leading to some definite results and aid in producing the much needed economy in this direction, for economy in the use of the coal supply which will be available next winter is not only desirable but necessary. Any plan that gives promise of a saving in this direction is worthy of consideration and trial. During the past winter the regulations affecting car heating were suspended by the Massachusetts Public Service Commission in order to save coal, and the heating of cars was made optional with each operating company. The traveling public accepted the conditions without serious complaint, but all operating officials recognize the desirability of providing heat for cars if this is at all possible.



# Way Department Requires Particularly Complete Organization

**The Work of the Department Requires Closest Co-operation with Other Departments, Specific Subdivision of Duties and Responsibilities, and Strict Discipline**

*By R. C. Cram*

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**T**HE recent articles by the writer have mainly been devoted to a discussion of some particular features of maintenance of way activities. Little or nothing has been said concerning the organization of way department and it may not be out of place to consider the subject at this time, since it is only by means of thorough organization that the work of the department can be satisfactorily accomplished.

A discussion of the general organization of an electric railway system would be out of order here, but it may be well to state that the way department is often in charge of an engineer or superintendent who is directly responsible to the executive officer of the company in general charge of operations, usually a general manager. The way department has been defined\* as "that division of the company organization having charge of the right-of-way, tracks, bridges and all matters pertaining to their construction and maintenance, with such other duties as may be assigned to it."

Way departments employ a great many men, especially during the summer season when extraordinary work of all kinds is under way. The larger roads will employ from 200 to 500 men the year round, with increases up to 1500 or more in summer. The number of men per mile of track steadily employed is usually somewhat greater than is found in steam-road work, due largely to the necessity for opening and closing pavements where the lines are located in larger communities. There are a number of special lines of work, which require a class of men having ability considerably above that required of the common laborer, such as bonders, drill operators, pavers, grinder men, welder men, hard-center men, and electric-switch maintainers. The efficient direction of so many classes of labor in several almost distinct lines of work requires the placing of dependence upon organization and discipline in order to harmonize their endeavors into the finished product, which is the track.

## What Constitutes a Good Organization?

Organization has been defined as the systematic union of individuals in a body whose officers, agents and members work together for a common end. It requires little argument to prove that any undertaking which involves the services of a number of people, can secure satisfactory results in economical management only through

co-ordinated direction by one head. Neither our industries nor the various activities of government could have reached the comparatively high state of efficiency now enjoyed, but for the beneficial effects of organization.

In planning an organization, the main object must be kept well in mind, and the following general principles will be found essential to the successful organization†:

1. At all points where action must be taken or decision made, authority should be centralized in one person.

Division of authority encourages evasion of responsibility.

2. The authority and responsibility of each position must be definitely outlined. Uncertain boundaries of authority lead to conflict and ill-feeling.

3. The duties of each position must be made to conform to the capabilities of the incumbent.

This may often best be done by supplanting the incumbent.

4. One person should not be made subordinate to two or more others, especially in regard to matters closely related.

5. The disciplinary authority should be placed in the same hands as the responsibility.

6. The work of administration should be distributed in such a way as to avoid unequal loading of officers.

7. There should be no positions which do not permit of promotion therefrom. Otherwise there is no incentive for incumbents to put forth their best efforts.

In reference to the foregoing, Willard‡ says: "In following these principles two things must constantly be kept in mind, namely, (1) that the individual is the most important unit in any organization, and (2) that nothing makes a man so conservative as responsibility. The former is lost sight of in many cases, but always to the detriment of the organization." Having planned the organization and filled the positions, the work is only started. The individual must be instructed, developed and trained to harmonize his work with that of his fellows. A co-operative spirit must be kindled and fanned to the flame of enthusiasm if the organization is to be successful.

It may be well to again quote Willard on a point which often comes up in electric railway service. He says: "One of the most difficult tasks in outlining any organization is to correlate the activities of the outside workers with the necessary correspondence, records and accounting on the inside. The man out on the job al-



The track department, as well as the band, needs an inspiring leader

\*Report Committee on Way Matters, American Electric Railway Engineering Association, 1911.

†See "Economies of Railway Operation," by M. L. Byers.  
‡Willard: "Maintenance of Way and Structures."



ways has his troubles with the man in the office, but much of the friction will be avoided if the man in the office has a first-hand knowledge of the work outside." This means that an office man in charge of records, for instance, is better able to get correct information promptly if he knows what he is after and how the work which he is trying to record is done. It also recalls the famous verses on the reports of one Finigan, the trackman, who was so often called upon to boil down his reports of derailments that his final report simply read "Off agin, on agin, gone agin, Finigan."

The way department is only one of several departmental agencies by means of which the operation of the road is carried on. In course of its activities the department comes in contact with these other departments in many ways and it must co-operate with them to the

fullest extent. The other departments chiefly concerned are as follows: (1) Operating, (2) electrical, (3) mechanical, (4) legal, (5) accounting and (6) purchasing.

Matters requiring co-operation with the several departments above enumerated may be classified in the same general order.

1. *Operating.* The operating department must be consulted on such matters as car schedules during reconstruction work; temporary diversions of traffic; location of crossovers; design of special-work layouts to give proper facilities; carhouse layouts; station facilities on interurban lines; special terminal track facilities; installation of electric track switches; removal of snow and ice and cleaning, sanding and greasing track.

2. *Electrical.* The electrical department must be kept in touch with matters of joint bonding; cross-bonding;

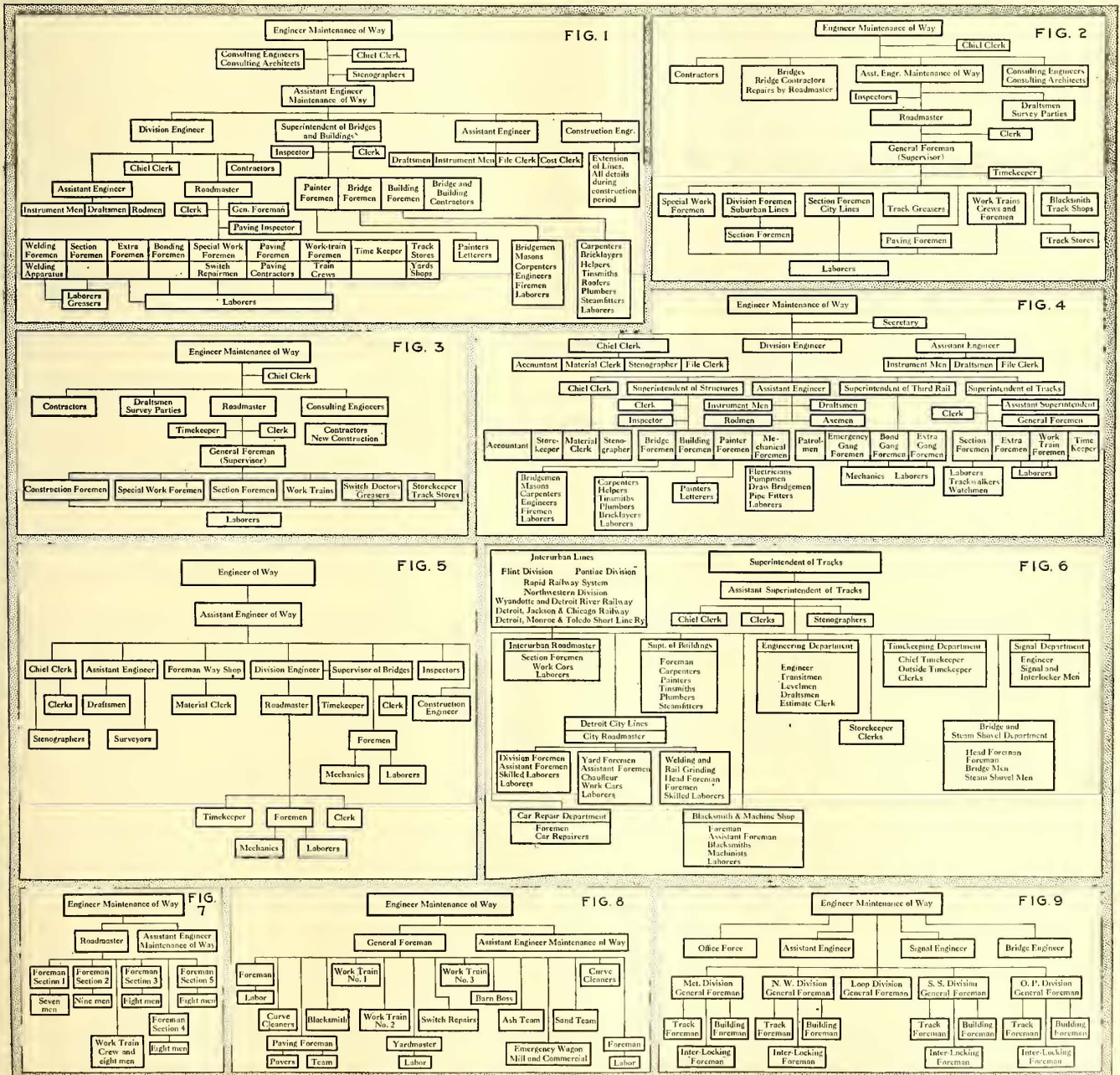


Fig. 1—For large property. Fig. 2—For property of moderate size. Fig. 3—Suggested for small property. Fig. 4—Alternative suggested form. Fig. 5—Chart recommended by committee on way matters of the American Electric Railway Engineering Association.

Fig. 6—For Detroit United Lines, prepared in 1912. Fig. 7—For New York State Railways, Rochester Lines (interurban), 1911. Fig. 8—For New York State Railways, Rochester Lines (city), 1911. Fig. 9—For Elevated Railroads of Chicago, 1915.

Organization Charts for the Maintenance of Way Departments



minimum clearance under trolley wire at close points under bridges; location of wire in track diversions; location of track facilities for handling coal and ashes at power stations.

3. *Mechanical.* The advice of the mechanical department is needed in matters having to do with car clearance; special departmental work cars; transfer tables in shops; grades and vertical curves; minimum curves in special work; repair of special, heavy track tools; upkeep of track which may be causing equipment damage.

4. *Legal.* The legal department must furnish advice in regard to accidents due to alleged track or pavement defects; franchise plans and petitions for additional track facilities; discussions with civic authorities in paving projects; supposed violations of ordinances or regulations affecting tracks.

5. *Accounting.* The auditor's department and the way department must be in touch with respect to payrolls; distribution of charges to proper accounts; furnishing of authorization numbers for all special expense appropriations; payments to contractors; records of expenditure; inter-departmental bills; bills against other concerns for work done, and all additions to or deductions from capital due to changes in structures.

6. *Purchasing.* The purchasing agent must be consulted in matters affecting purchase of supplies; standard stocks of materials; storage and withdrawal of materials; inspection of material; pricing of material and supplies for estimates.

It is obvious that the number and extent of the departmental organizations must depend upon the size and character of the property. On small properties the duties of several department heads are assumed by comparatively few men, while the larger properties will often have at least the six departments above noted and sometimes more. These departments will often be made up of several subdivisions, each handling a branch of the work.

### Organization Charts Help to Co-ordinate Duties and Personnel

It is the practice on most electric railways to have a diagram or chart of the organization of the way department for the purpose of clearly defining the duties and authority of the individuals in charge of the varied phases of the work. While it is true that there is no scheme of organization which will suit more than a few properties, there are features which are much in common and in the main such organizations are only variations of the general organization schemes shown in the accompanying charts.

It should be remembered that the organization diagram or chart will be largely controlled by the size and scope of the work undertaken by or in charge of the department.

In respect to these charts it may be of interest to note that Figs. 1 to 4 were charts prepared for discussion by the way committee of the American Electric Railway Engineering Association in 1911, while Fig. 5 is the final chart which was presented by that committee in its report on organization and rules for the way department.

Fig. 6 shows the scheme in effect in Detroit in 1912, while Figs. 7 and 8 present the organization in Rochester

in 1911. Fig. 9 is presented to give an idea of the organization used in the way department of the Elevated Railroad of Chicago.

In carrying out the work of the way department, there are many rules and regulations governing the performance of work and duties of individuals, but in general these rules are not in book form and have been put in effect in the shape of letter instructions or bulletins. Many rules and regulations are in force simply as unwritten law, so to speak. There is no doubt but that much good would result if the way departments paid more attention to this subject along the lines suggested by the 1911 way committee in its report, which contains an admirable set of rules and regulations for the government of the way department.

### Results Are Dependent Upon Discipline in the Organization

Discipline has been defined to include instruction and government. Instructions to way department employees are usually given in the form of oral instructions from roadmasters and foremen. These in turn must get their instructions from the head of the department in the form of oral instructions, printed rules and specific plans.

Government consists in directing and securing obedience to the rules and instructions. The best of rules and instructions will not secure good workmanship; this must be had by proper supervision, which calls for frequent and careful inspection with a judicious use of incentives and penalties. Willard may well be quoted here on this point as follows: "Discipline is administered in maintenance departments by a reprimand, suspension or both.

A record of the services of each man, even down to the track laborer, should be made when he enters the service and record kept afterward of his services to the company. For minor offences a personal reprimand, given with the understanding that it will be entered in the man's record, will produce the best results with most men. The severity of any sentence, as well as promotions, should largely be based on a man's previous record. That organization which recognizes its old and faithful employees in the way of promotion when vacancies occur, will always have more loyal and efficient employees."

### Combustion Engineers Wanted by Fuel Administration

The Bureau of Oil Conservation, Oil Division, U. S. Fuel Administration desires to secure a combustion engineer for each of the districts named below, who will act as inspector of all plants within the district using fuel oil and natural gas: Boston, Providence, New York City, Philadelphia, Pittsburgh, Buffalo, Detroit, Chicago, Minneapolis, Tulsa, New Orleans and San Francisco. It is desired that these men shall act as volunteers. The administration will pay a reasonable compensation for men who cannot give their services for nothing. Only those who have had experience in the combustion of fuel oil and natural gas would be of value to the administration. Application can be made to W. Champlain Robinson, Director of Oil Conservation, Oil Division, United States Fuel Administration, Washington, D. C.



# Increased Economy Results from Correct Operation of Car Equipment

By C. W. Squier  
Electrical Engineer

The Effects of Various Rates of Acceleration and Braking on the Schedule Speeds and Power Consumed in Car Operation Are Discussed, Together with the Relation of the Length and Number of Stops to the Cost of Operation

IT IS THE DUTY of a good motor designer to determine all the factors of possible waste in the equipment he is designing and endeavor to eliminate or reduce them. The operation of the motors involves some losses that cannot be avoided, but all can be kept at a minimum by correct operation, and much energy can be saved by careful and efficient operators.

The energy wasted in car operation includes the losses in the grid resistors, the iron and copper losses in the motors during acceleration and the energy absorbed in braking which is dissipated as heat in the brakeshoes and wheels. The useful energy is that which is used in overcoming train resistance, including the resistance due to grades and curves. In considering the means available for reducing the power necessary in operating a car over a definite run at a certain schedule speed, the effect of varying the different cycles of operation will be shown. The accelerating cycle which forms the first part of every run ex-

creasing the car speed at as nearly a uniform rate as possible in the shortest time consistent with current peaks, wheel slippage and comfort of the passengers. Such a consideration is quite independent of the manner of manipulation of the apparatus.

The only way in which a designer can control manipulation is by making the apparatus automatic in its functioning. The accelerating force is a certain constant amount to which impulses are added as the various steps of the starting resistors are cut out. For any given average rate of acceleration the same amount of energy is wasted in the car resistors every time the car is started and the controller is brought to the full parallel position. This is entirely independent of the length of the run, the number of stops per mile, the rate of braking, or the length of stop.

As the length of the run increases this constant rheostatic loss becomes a smaller percentage of the total power used. It is thus on short runs that the economy of rapid acceleration is most apparent. As a study of the effect of different rates of acceleration

on the energy input for a car operating under average conditions I have plotted the several graphs shown in Fig. 1, for rates of acceleration of  $\frac{3}{4}$ , 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ ,  $1\frac{3}{4}$  and 2 m.p.h.p.s. The operating conditions assumed are the same as those already given in this series of articles, and are for a 23.56-ton car making a run of 670 ft. at a schedule speed of 8 $\frac{1}{2}$  m.p.h. with a



Even the small boy knows that coasting saves energy

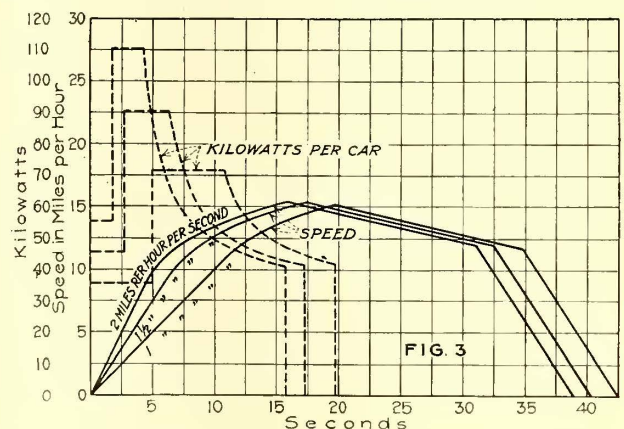
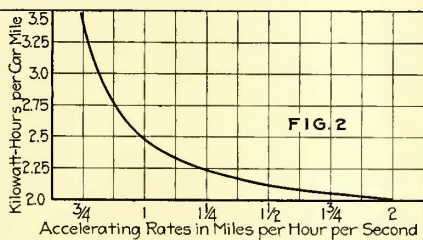
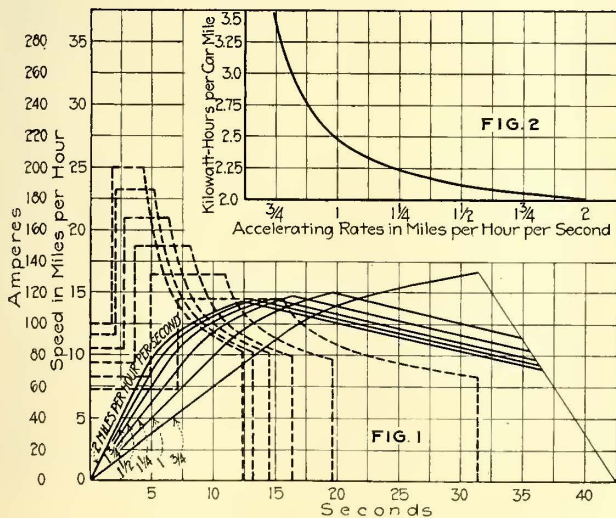


FIG. 1—INFLUENCE OF VARIOUS RATES OF ACCELERATION ON THE POWER INPUT OF A CAR. FIG. 2—RELATION BETWEEN POWER INPUT PER CAR-MILE AND ACCELERATING RATES IN MILES PER HOUR PER SECOND. FIG. 3—EFFECT OF VARIOUS RATES OF ACCELERATION ON THE SCHEDULE SPEED MADE BY A CAR

tends from the starting of the car through the period in which it is brought into motion. The ultimate speed of a car depends on the duration of this accelerating period and the grades or curves encountered. The efficiency obtained during the accelerating period depends on the waste in energy and time that takes place.

The aim of control designers is to provide for in-

7.2 second stop, the rate of braking being taken at 1 $\frac{1}{2}$  m.p.h.p.s. The results are given in Table I.

The difference in energy saving is considerably less between the higher rates of acceleration than it is between the lower rates. For example, the saving through accelerating at 1 m.p.h.p.s. instead of  $\frac{3}{4}$  m.p.h.p.s. is 27.8 per cent, while the saving through accelera-



tion at 2 m.p.h.p.s. as against 1½ m.p.h.p.s. is only 0.1 per cent.

To illustrate this decreased variation the graph shown in Fig. 2 has been constructed, with varying rates of acceleration plotted against the energy per car-mile required. It will be noted that there is a "knee" in the graph between the 1 and 1½ m.p.h.p.s. points, and for

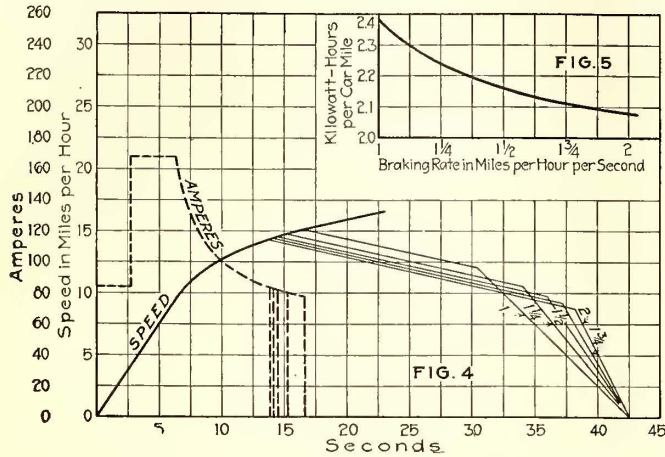


FIG. 4—COMPARISON OF POWER INPUT FOR A CAR OPERATED WITH VARIOUS RATES OF BRAKING. FIG. 5—RELATION BETWEEN POWER INPUT PER CAR-MILE AND THE BRAKING RATE IN MILES PER HOUR PER SECOND

rates higher than this the difference in energy saving is comparatively small.

In this particular case it appears that the economic limit of acceleration is reached at about 1½ m.p.h.p.s., and the small additional economy that results from a higher rate of acceleration would more than likely be offset by the increased cost of maintaining the equipment and the resulting decreased comfort of passengers.

Referring to the graphs in Fig. 1 we find that when accelerating at the low rate of ⅔ m.p.h.p.s. it is necessary to operate the car without coasting in order to make the schedule speed of 8½ m.p.h. This, of course,

tained by increasing the schedule speeds as the rate of acceleration is increased. This, of course, takes more power, so the saving results from operating fewer cars to perform the same service, and is shown by the decreased cost of platform expense as well as by a small total saving in power.

To show the economies that may be expected in this direction I have plotted the graphs shown in Fig. 3 for the same equipment used for the previous graphs. The rates of acceleration taken are 1, 1½ and 2 m.p.h.p.s. and the basis for determining the point at which power is cut off is arrived at by making the number of seconds consumed in coasting equal to the speed in miles per hour at the point of cut-off. Thus, when accelerating at a rate of 1 m.p.h.p.s. the point of cut-off is 15.1 m.p.h. and the car is allowed to coast for 15.1 seconds before the brakes are applied. This method of making the amount of coasting in seconds equal to a constant times the speed in miles per hour at cut-off is very convenient for comparing runs of different lengths at different schedule speeds, and the results obtained for a continuous run with various stops by using this method will approximate very closely to the service obtained from a typical run.

To make certain that the continuous current rating of the motors is not exceeded, a typical run should be laid out and the speed-time and power-input graphs plotted. The ratio of the amount of coasting in seconds to the speed at cut-off in miles per hour for this typical run will be the constant desired.

### Operating Cost Decreases as Acceleration Rate Increases

In Table II the resulting operating cost for three different rates of acceleration are shown for comparison. To illustrate the annual saving it may be assumed that each car will operate 40,000 miles during the year, that the average platform expense will be 60 cents per car-hour plus 10 per cent, and that the cost of energy at the car will be 1½ cents per kilowatt-hour. A total

TABLE I—COMPARISON OF ENERGY TAKEN WITH DIFFERENT RATES OF ACCELERATION

Acceleration Rate M.p.H.p.S.	Speed at Which Last Resistance Step Is Cut Out, M.p.H.	Rheostatic Accel- erating Period, Seconds	Total Accelerating Period, Seconds	Kilowatt-Hours		Per Car-Mile	Per Cent Power Saving Over Rate of ⅔ M.p.H.p.S.
				For Rheostatic Accelerating Period	For Total Accelerating Period		
1	11.65	15.5	13.3	0.210	0.4012	3.42	...
1½	10.79	10.8	19.7	0.167	0.2896	2.47	27.8
2	10.05	8.0	16.3	0.139	0.2648	2.23	34.8
3	9.49	6.3	14.5	0.124	0.2502	2.12	38.0
4	8.92	5.1	13.2	0.116	0.2400	2.04	40.3
5	8.55	4.8	12.3	0.101	0.2377	2.02	40.9

TABLE II—EFFECT OF THREE RATES OF ACCELERATION ON SCHEDULE SPEED AND OPERATING COSTS

Acceleration Rate M.p.H.p.S.	Schedule Speed, M.p.H.	Energy Kilowatt- Hours per Car- Mile	Car-Hours for 40,000 Car-Mile Operation	Platform Wages at 60 Cents per Car- Hour Plus 10 per Cent	Power Cost at 1½ Cents per Kilo- watt-Hour	Total Cost	Per Cent Saving
1	8.5	2.47	4,706	\$3,105.96	\$1,482.00	\$4,587.96	...
1½	8.9	2.44	4,494	2,966.04	1,464.00	4,430.04	3.3
2	9.2	2.39	4,348	2,869.68	1,434.00	4,303.68	6.2

could not be done in regular service, so that the average rate of acceleration must be higher than ⅔ m.p.h.p.s. if the desired schedule is maintained.

### Further Economies Result from Increasing Schedule Speeds with Rate of Acceleration

In making these comparisons of energy taken for various rates of acceleration, the point should not be lost sight of that we are considering that the cars and equipment have a definite service to perform. Other advantages of a higher rate of acceleration can be ob-

served. A saving of \$157.92 per car per year is obtained by increasing the rate of acceleration from 1 to 1½ m.p.h.p.s. and the schedule speed from 8.5 m.p.h. to 8.9 m.p.h. The total saving per car per year obtained by an increase in acceleration from 1 to 2 m.p.h.p.s. and increasing the schedule speed of from 8.5 to 9.2 m.p.h. is \$284.28, or 6.2 per cent. If we consider a single line 8 miles long operating a service at five-minute intervals, this would take twenty-four cars at a schedule speed of 8.5 m.p.h. and twenty-two cars at 9.2 m.p.h., or a saving of two cars for the line. We thus see the



advantages which are to be gained by keeping the accelerating rate up to the maximum consistent with the equipment operated.

### A High Braking Rate Reduces the Power Input

To illustrate how the energy input varies with different braking rates, the graphs shown in Fig. 4 have been plotted. These are made on the basis of accelerating at  $1\frac{1}{2}$  m.p.h.p.s. and results are shown for rates of retardation of 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ ,  $1\frac{3}{4}$  and 2 m.p.h.p.s. The saving in energy is obtained by cutting off power sooner and coasting to a lower speed before applying the brakes to produce a higher rate of retardation.

Fig. 5 is a graph for the various braking rates plotted against the energy required to make the run. As in the accelerating graph, Fig. 2, we see that there is a "knee" in this curve beyond which the energy saving is comparatively small. The "knee" in the retardation graph, however, is less pronounced than that in the accelerating graph. In actual service for surface lines it has been found that the most economical braking rate lies between  $1\frac{1}{2}$  and  $2\frac{1}{4}$  m.p.h.p.s., depending on the characteristics of the equipment and the service operated. Beyond this it is better to consider careful handling of the equipment and the comfort of passengers in preference to the slight additional economies that result.

### With Shorter Stops Smaller Motors Can Be Used

The number and length of stops are two factors of prime importance in car operation. They determine, in a measure, not only the size of the motors but also the energy consumed, the schedule speeds obtained, the

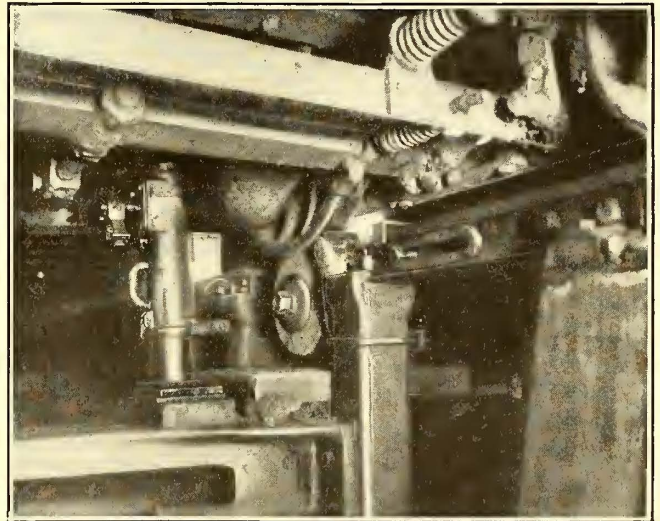
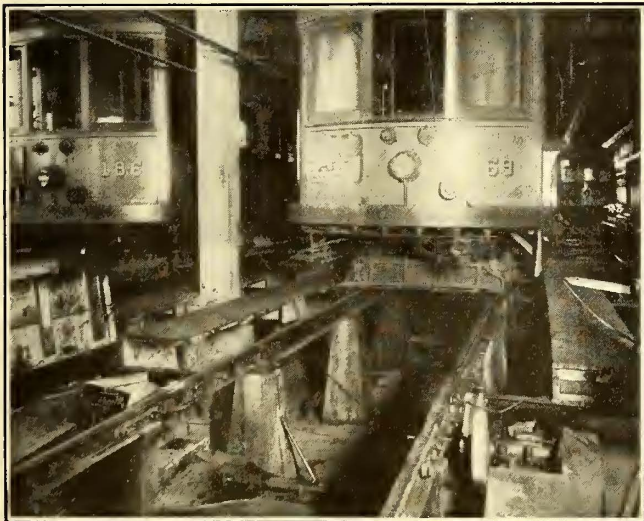
doors, steps and platforms, and by the efficiency of the operating crew. A very little confusion will lengthen a stop from two to three seconds. In the service that we are considering, with eight and one-half stops per mile and a run 8 miles long, 6.8 minutes would be lost in a round trip by increasing the average length of each stop three seconds. This would necessitate using an additional car on the line, and when the cost of the power used for operating this car, together with the additional cost of the platform wages is figured, a good idea of the effect of a few seconds at each stop can be obtained.

### Operating a Pit Grinder Without Rheostatic Losses

TO TRUE flatted car wheels with a pit wheel grinder it is desirable to reduce the speed of the car wheels much below that obtained with 500 to 600 volts applied to the car motors. As the use of grid or water rheostats for reducing the voltage at the motor terminals involves large losses, Homer MacNutt, superintendent of motive power San Diego Electric Railway, used 110 volts obtained as follows:

To the pit grinder motor he has connected a counter-shaft which drives a 110-volt generator. This in turn supplies the current for running the railway motors at the lower speed with a very small loss of power. Another advantage of this plan is the greater safety provided for the operator inasmuch as the 600-volt trolley circuit is entirely disconnected from the grinder. A field rheostat gives a range of 80 to 110 volts.

This pit grinder is of the usual Q. M. S. type equipped with Norton crystalline wheels No. 20, 14 in. in diameter



AT LEFT, PIT GRINDER WITH SCOTCHING PLATES FOR ASSISTING IN LOCATING WHEELS PROPERLY; AT RIGHT, CAR IN POSITION FOR GRINDING WHEELS

number of cars necessary for a given service, and the capacity of the line and power house. This is one of the largest fields for operating economies that can be found in electric railway operation to-day. In my article in the *ELECTRIC RAILWAY JOURNAL* of April 20, I showed how the number of stops affects the schedule speeds and really forms an operating characteristic for the selection of the motors. The duration of stop is determined largely by car design, by the size and type of

by 2 in. face. About thirty minutes is required to grind the average wheel. This rapidity is due in part to the use of scotching pieces or stops on the rails whereby the operator of the car can center the car wheels quickly without help. The stops are simply metal shoes with enough of a central depression to make itself felt to the shopman who is running the car. Because of the time saved in jockeying for position one man can make all preparations necessary for grinding in five minutes.



# Applying Common-Sense in Line Construction

**Money and Time Can Be Saved by Close Co-operation of Designer and Constructor and by Attention to Details Commonly Overlooked**

*By Charles R. Harte*

Construction Engineer,  
The Connecticut Company, New Haven, Conn.

THE locations and heights of the supports for a line are usually first laid out in the office, from the location plans and profile. This preliminary determination should then be tested in the field to insure that due regard has been given to the actual conditions. If the plotted information has been complete, the paper location will require little changing, but it frequently happens that the preliminary survey was rushed and that important factors have been overlooked.

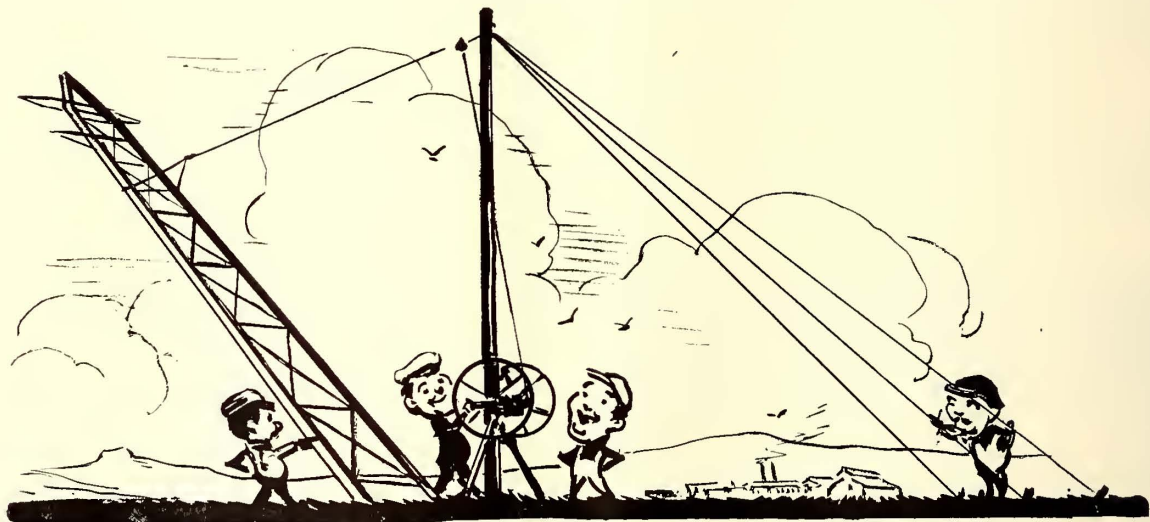
## An Extreme Case of Failure to Apply "Horse-Sense"

On one important transmission line there was a stretch of rolling ground having a distance from top to top of the "rolls" practically that of the spans of the line. The "engineer" who made the profile took his

attention between the designing and the constructing branches. A contractor's suggestion may be only an effort to get an "extra," but it is always a good plan to have it looked into on general principles.

Ordinarily the kind of support to be used will be determined first, and the locations and heights afterward. It is possible also that in very rough country, across thickly settled sections and in similar cases, the locations and heights may be fixed and so determine to a considerable extent the character of support required.

If the choice has been wood poles and native wood is used, the poles can generally be purchased delivered at the hole. In this case the seller should be furnished with a schedule giving the pole number and the height of the corresponding pole, together with such notes as



No "pikers" needed. Apply to the foreman of the wood pole gang

levels in the valleys and the office located the towers also in the valleys, bringing the high spots under the middle of the span. Not until the wires were up was it discovered that in this section the lower conductors were normally only 8 ft. from the ground at mid-span.

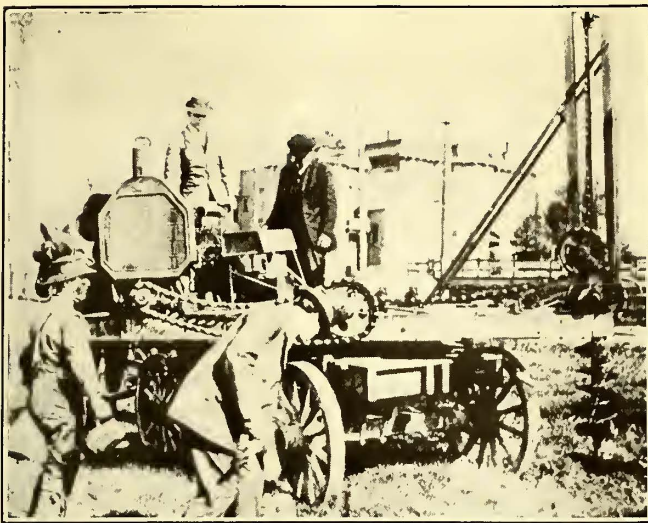
On the same line at one point a tower was located on a bit of level ground, but just at the foot of a sharp slope. The outside wire on the side of the slope could actually be touched by a "six-footer" at one point. The undoubtedly high cost of the extensions by which the line was given proper clearance would have been saved, and a number of other undesirable but not actually dangerous conditions prevented, had some one familiar with line construction checked the paper location against the actual conditions. For that matter if the "engineer" in charge of the work had listened to the contractor in a spirit other than one of open hostility the same result would have been secured.

In all construction work there should be close co-oper-

ation between the designing and the constructing branches. A contractor's suggestion may be only an effort to get an "extra," but it is always a good plan to have it looked into on general principles. Ordinarily the kind of support to be used will be determined first, and the locations and heights afterward. It is possible also that in very rough country, across thickly settled sections and in similar cases, the locations and heights may be fixed and so determine to a considerable extent the character of support required. If the choice has been wood poles and native wood is used, the poles can generally be purchased delivered at the hole. In this case the seller should be furnished with a schedule giving the pole number and the height of the corresponding pole, together with such notes as

will enable him to find about every fifth stake from local references familiar to him, such as farm houses, roads, etc., or from objects readily seen. With such a list he can deliver without further help from the buyer, but it is much better to have an inspector present. The work then moves faster, provided of course that the inspector knows the line in advance, and disputes and delays from errors are largely prevented. Poles from outside and treated poles—of which more hereafter—are usually delivered on cars, and must be distributed. Treated poles should be framed before treatment. Other carload poles are best framed in the yard where they are unloaded. Indeed, framing is always best done in the yard, but where, as is usually the case with native poles, delivery at the hole is as cheap as delivery in the yard, this saving more than offsets the gain of yard framing. Where poles are field framed the arms and attachments are put on at the same time, making some saving here. But in a properly arranged





POWER AUGER USED FOR DIGGING TELEPHONE LINE POLE HOLES



SETTING POLES BY CAR DERRICK—POLE HOOKED ON, HORSES HOISTING

yard there is no time lost going from pole to pole, and particularly if the poles are to be shaved, the derrick used for unloading makes a very considerable saving in labor.

It is still the practice, in many cases, simply to roll the poles off the car by hand after as many as can do so have fallen when the stakes are out. This, however, is dangerous to the men, is apt to break some of the poles, and necessitates much additional labor in rolling the poles into piles. A derrick, on the other hand, unloads with safety to men and materials in a fraction of the time, and places the poles where wanted, particularly if, as it should, it has a long boom. A derrick saves the cost of helpers for the framers, and is usually invaluable in handling heavy material, other than poles, from cars to trucks.

**A Good Inspector Would Have Prevented This**

In order to determine whether the pole was a live cut it is customary to specify that the pole shall not be shaved. This is usually interpreted to allow knot and branch projections, although the latter are usually "to be trimmed close," so that quite a little draw-knife work is necessary after delivery. Following this, the butt is

cut square, the top roofed, and the gains and faces made. In firm soil the requirement of a square butt is not as essential as in soft soil, where it is very important.

The writer was once delighted with the speed with which a new foreman set poles—until a day or two later, when the crossarms were apparently all that kept them from toppling over. The "villain" had sharpened the butts, dug a hole about a foot deep, wiggled the pole with the spikes after it was up, and moved on to the next!

The roof treatment depends somewhat on the attachments, for there are several special top pin fixtures requiring individual framing. If none of these are to be used, the most general practice is to form a wedge, although an almost equally common method is to sharpen to a point, the pitch angle in either case being about 45 deg. The wedge is usually set with the edge at right angles to the direction of the line, but where roof pins are employed and are doubled the edge should be parallel to the line.

Gains are cut of just the width of the arm, from 1/2 in. to 1 in. deep at the center. They should be slightly concave, so that the arm will bear on the edges, thus preventing rocking. With the best of care, however, it is difficult

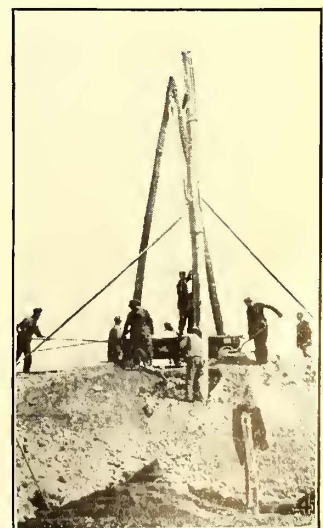
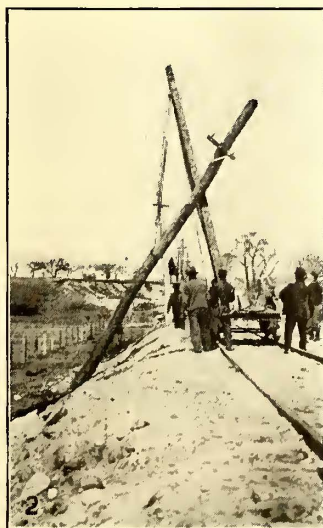


Fig. 1—Pole coming up bank. Fig. 2—Pole nearly up. Fig. 3—Pole in place and nearly lined. Fig. 4—Pole lined, hole being filled  
SETTING POLES BY CAR DERRICK



to get a good fit, and as the average "pole butcher" comes far from being careful, there have been developed several patent metal gains, which are lagged or spiked to the pole. These do not require cutting of the pole otherwise and give as good a fit to the arm as the dimensions of the arm permit, for crossarms are not always true to a hair.

Faces are required for many of the patent fittings, and for some that are not patented, for that matter. The shape is of course fixed by that of the contact surface of the fitting, but the face should be at least  $\frac{1}{2}$  in. larger all around, and like the gain should be hollowed a little to insure a firm bearing.

After the framing is completed, including the boring of holes for the bolts, all of the cut surfaces should receive at least one, and, better, two coats of some good preservative. If the pole is not to have butt treatment it should also receive at least a "belly band" or belt of preservative extending 1 ft. each way from what will be the ground line when the pole is set.

### Some Minor But Important Points in Line Construction

If the pole is yard-framed the attachments will not be installed until the pole has been delivered at the hole. If it is field-framed they go on immediately after the preservative, and there are one or two little points that should be remembered in this connection. For example, bolts should be so driven that the nut is always next the attachment. No one who has ever tried to back out a bolt in order to replace an old crossarm needs to be told why, but there are many so-called "linemen" who do not stop to think of maintenance, and unless closely watched can cause much trouble later on.

The projecting ends of bolts should be cut off close to the nut. This is rarely done, but it should be the rule. With the best of judgment in getting materials and distributing them there will be occasions when it is cheaper by far to use a long bolt on a short grip. The resulting end sticks out like a sore thumb and is a menace to the linemen's clothes if not to their persons.

Care should be taken that the fittings all make the same angle with the center line of the pole. Nothing makes a line look worse than a little variation in crossarms, brackets or other fittings that should line up. It is quite customary to install crossarms but leave the braces free until the poles are set to insure good line, but with reasonably straight poles practically as good results can be secured by completing the work on the ground.

### Digging Pole Holes May Be Quite a Job

In ordinary soils digging the hole is a comparatively easy proposition, although it takes a little experience efficiently to handle the lower portion. An ordinary short-handled round-point shovel is much the best tool for the first 3 ft. or 4 ft., and if the hole is large enough for a man to stand in it and work it is best for the entire depth. For most holes, however, a long-handled round-point shovel and a spoon will be required from about 4 ft. on. A pick for the surface and a digging bar for the deeper portions are also needed unless the soil is soft and free from stone. Patent diggers are used in some instances, with varying success;

in general they do not work as well as the usual shovel outfit.

Ordinarily conditions do not warrant the use of power diggers, but on a Western telephone line a gasoline earth auger is said to have been very successful. Unless the ground was fairly free of stone and unless there were a large number of holes the overhead cost would eat up all saving unless the time saved was worth the difference, particularly as the device would have to pay for itself on the job.

### Sometimes It May Not Pay to Blast Out Rock

Rock is always a nuisance, and often considerably worse than a nuisance. In the open a heavy charge will often so shatter the rock that it can be readily taken out, but it is important that it is not merely cracked into large blocks, as these are very difficult to handle, while the blocks necessitate heavy charges to further break them up.

Where the rock is at the surface and is of good quality the pole may with advantage be set on the top and held in place by a special shoe stone-bolted down, or by three strap bolts set in holes 120 deg. apart on the outside edge of the butt. Such bolts should extend at least 12 in., or better, 18 in. into the rock, and may be held by filling the space between them and the hole, which should be about  $\frac{1}{8}$  in. larger than the bolt itself, with melted lead, sulphur or Portland cement grout. In place of using one of these the end of the bolt may be split to receive a wedge which, when the bolt itself is driven down, jams the sides against the sides of the hole. It is hardly necessary to point out that, if lead or sulphur is used, the holes should be perfectly dry. A little moisture converted to steam by the hot material can throw a small amount of melted lead or sulphur over an astonishingly large area.

The upper ends of the bolts should be about a foot long, measured from the rock, and should be flattened and lagged to the pole. For poles up to 40 ft. high above the rock  $\frac{3}{4}$ -in. bolts will serve unless the line is exposed to heavy winds. In the latter case, and for higher poles the bolts should be of inch stock, and the lags should be about 6 in. long as against 4-in. lags for the smaller bolts.

### Soft Ground Requires Reinforcing for Pole Support

Very soft material is often even harder to handle than rock. If they are too "quick" and if the poles are not too large, soft soils can be conquered with headless barrels, the hole being started as usual and the barrel then set in it and forced down as the material is taken out by the man inside. When the top reaches the surface a second barrel is set on it, three or four cleats inside keeping it in line. The bulge of the barrels and the poor connection usually limit the "string" to two, giving less than the proper depth just at the point where deep setting is needed. By filling the space between the barrels and the pole with concrete this difficulty is removed.

The hole may be dug inside of driven sheeting, in which case it will usually be made square for convenience. For this a square frame of 6-in. x 6-in. timber, having clear inside dimensions slightly greater than the



diameter of the pole is placed in position and a similar square with inside dimensions greater than the outside dimensions of the first by an amount about  $\frac{1}{2}$  in. more than twice the thickness of the sheeting to be used is placed outside it. The sheeting is then set up in the space between the braces and driven down as the excavation inside proceeds.

By sharpening the sheeting so that the cutting edge is

ring of the first set forming the top outside ring of the second set.

If there are many soft holes, by far the best device is a steel cylinder in halves, of a length equal to the deepest hole required, and a diameter sufficient for the largest pole. The outside should be free from any projections, the clamps coming inside, and there should be two stout rings on each half. It is used just as are

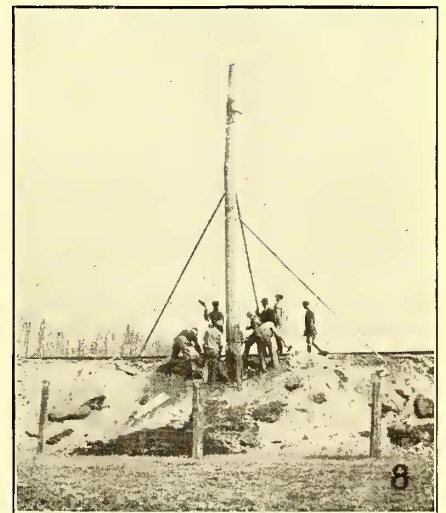
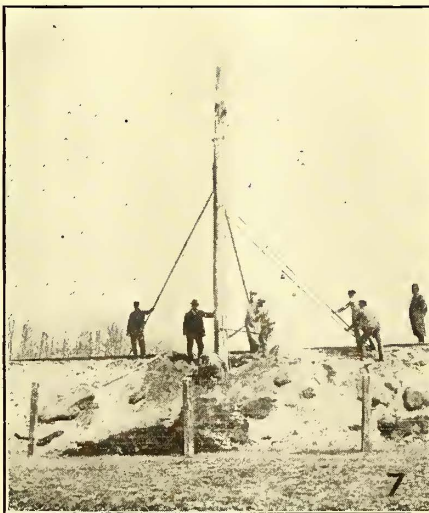
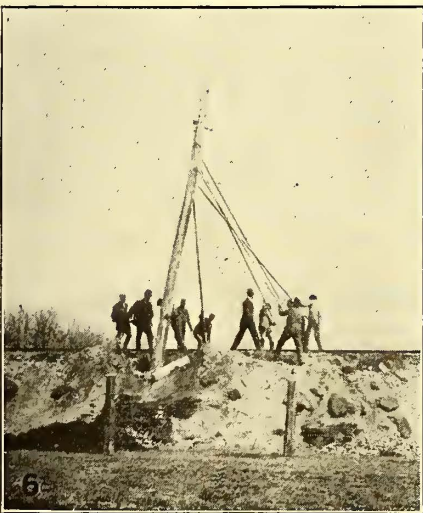
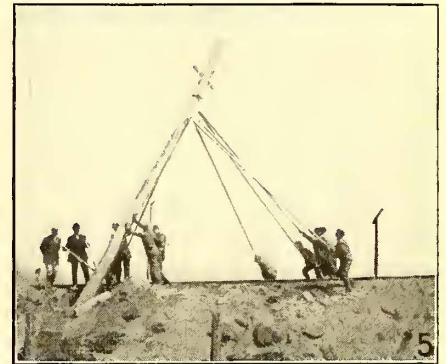
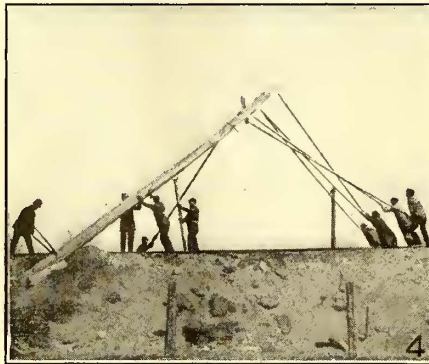
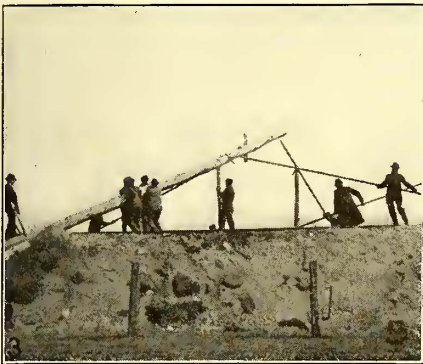
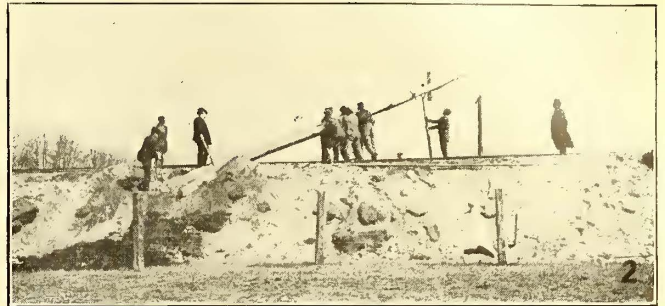


Fig. 1—Lifting. Fig. 2—Ready for pikes. Fig. 3—First pikers piking. Fig. 4—All pike poles in, note butt man twisting pole with cant hook. Fig. 5—Jinny at end of its service. Fig. 6—

Butt sliding into hole. Fig. 7—Pikes grounded, butt man giving last twist before filling in. Fig. 8—Pole in place and lined up, hole being filled.

SETTING POLES BY HAND

at the outside and slants to a point on the edge next to the previous piece it can be kept fairly straight and tight, but additional bracing rings should be set inside every 3 ft. or 4 ft. If the hole is much more than 6 ft. deep it may be necessary to use a second set of sheeting, in which case the first set should form a square enough larger than the required hole. With 6-in. bracing and  $1\frac{1}{2}$ -in. sheeting this would require 15 in. additional width and breadth in the top, the bottom inside

barrels, but after the pole has been set it is pulled out by tackles or jacks and taken off the pole by separating the halves. It is then ready for the next hole.

How Deep Should Poles Be Set?

The question as to what should be the depth of setting has been answered in different ways by different people, but the values adopted by the American Elec-



tric Railway Association have been largely used. They are as follows:

Length of pole in feet	Depth of Hole	
	In rock or with concrete setting	In earth
30.....	5 ft. 0 in.	6 ft. 0 in.
35.....	5 ft. 6 in.	6 ft. 0 in.
40.....	5 ft. 6 in.	6 ft. 6 in.
45.....	6 ft. 0 in.	6 ft. 6 in.
50.....	6 ft. 6 in.	7 ft. 0 in.
55.....	6 ft. 6 in.	7 ft. 6 in.
60.....	7 ft. 0 in.	8 ft. 0 in.
65.....	7 ft. 0 in.	8 ft. 6 in.
70.....	7 ft. 0 in.	9 ft. 0 in.

In very compact soil values intermediate between rock and earth may be used, while if one-third or more of the bottom part of the hole is rock, rock values will be ample.

### Economy in Man-Power Is Essential in Pole Raising

The poles having been framed and delivered and the hole dug, it remains to erect them. The good old-fashioned way is to pike them up by hand. A board is stood up at one side of the hole, and the pole brought up with the butt against this and resting on a short piece of plank on the opposite edge. One man with a cant hook stands at the butt to keep it on the plank. Another holds the "jinny," which is a substantial prop of Y-shape about 7 ft. long. The rest of the gang lift the top, starting at the top and walking toward the butt as it rises, while the jinny man follows along to prevent any drop in case the men should slip.

As soon as the top is 8 ft. or 10 ft. above the ground the two first pikers "stick" it and lift as far as they can. The others in turn "stick" in pairs and lift, each pair moving in in turn and "sticking" again as the lift takes their point out of reach. Meanwhile the jinny man keeps his prop close against pole and ground as long as it is effective, which is until the pole is at an angle of about 60 deg. with the horizontal. As it approaches the vertical the butt man twists it if necessary to keep the arms properly lined. When fully up it is plumbed, or raked as the case may be, by the foreman, and then is held in position by grounding the pikes in a circle about it until the hole is well filled.

Chestnut poles require, roundly, as many pairs of pikers as one-third of the pole length in feet, together with one jinny man and one butt man for poles up to 45 ft. long. Two butt men are required for longer poles. Cedar poles are considerably lighter, and the gang for the shorter lengths may be reduced by a pair of pikers.

### Mechanical Pole-Raising Devices Have Their Place

To-day, however, the tendency is to employ some form of mechanical setter, either in the simplest form, a gin pole, or, if the extent of the work warrants, a more elaborate form of derrick mounted on a car or truck and operated by hand winch, horse tackle or gasoline hoist. With these there will be required four laborers, a driver, or an operator, depending on the form of hoist, two men to hook on to the poles, one of whom can also serve as butt man, and one or two pikers for lining up. For the shorter poles there is not much if any saving in number of men, the economy coming in the greater speed. For the longer poles there is a large saving both ways, and there is far less liability of accident.

If the pole is to be subject to heavy strain it is now "keyed" with wood, stone, or concrete, at least 4 in. thick, and with a cross-sectional area not less than 32 sq.in. One key, at least 2 ft. long, is placed on edge at the bottom of the hole on the side opposite the anticipated strain; the other, 4 ft. long, is placed on edge at the surface, on the side of the strain. At least, this is the case in firm soil; in soft ground the keys may have to be considerably larger, or the desired result may be secured by filling the hole with concrete.

Whether the re-fill is earth or concrete it should be put in layers and well tamped. There should be at least three men tamping to one man shoveling, and the material should be piled up in a little mound around the pole both to shed water from it and to prevent the formation of a small pond by the settling which is sure to occur. If there are pieces of rock available these should be saved for the upper part of the hole unless needed to stiffen up a soft bottom. In the latter case it is often desirable to make a "pancake" or "biscuit" of concrete, 6 in. or 8 in. thick, in the hole.

If carefully lowered, a pole can be set on such a bottom in about thirty-six hours after the concrete is placed, but it is better to let the converter set for a week. If it must be used sooner, a cushion of earth about a foot deep will help maintain the virtue of the green concrete.

### Insulators Replaced on a 23,000-Volt Live Line

THE Elmira Water, Light & Railroad Company recently changed the insulators on one its 23,000-volt lines without interrupting service. The old insulators gave considerable trouble due to breakdowns especially during electrical storms, and the only way to remedy the trouble was to install insulators designed for higher voltage. This line is 20 miles long and so important that shutting it down for intervals necessary to change over the insulators was not to be thought of. The problem of substituting the higher voltage insulators was solved by the use of some patented special tools designed by the Georgia Railway & Power Company.

When the work was first undertaken the men were somewhat timid but with a few days' experience they developed confidence and speed so that the gang of three men averaged sixteen poles per day. The handles on the tools with which the wire was gripped were from 6 ft. to 12 ft. long and so well insulated that at no time was the slightest shock experienced. The only sensation felt was due to a static discharge which took place whenever a tool touched the live wire. This was loud enough to be heard by the men on the ground.

The method used in replacing the insulators was as follows: There were two pole pins and an inside pin on each arm. A short ladder was hooked over the arm in order to work on the outside pin. The tie wire was then cut by using a bolt cutter with a 3-ft. wooden handle and the live wire was lifted from the insulator by using a special anchor pole with a block and fall attached to the ends. This held the wire in an elevated position where it was then pulled over by guy lines. The insulator was then replaced and the wire again lowered into place by using the block and fall.



# What Is the Cure for Condenser Tube Corrosion?

**Longer Life Will Be Secured from Condenser Tubes by Proper Selection of Material and Care in Manufacture Rather Than by Modification of Conditions Directly Under the Control of the Operator**

*By Hartley LeH. Smith*

Chief of Testing Bureau  
Brooklyn Rapid Transit System

**I**N THE modern power plant, operated with surface condensers, corrosion of the innumerable and tiny tubes which make up the "internal economy" of the condensing apparatus has long been the bane of the operator's existence. There is daylight ahead, however, in this matter for, like most of the problems of these days of increasing use of research methods, the condenser tube problem promises a real solution at no very distant date.

For many years the development of ideas concerning tube corrosion was very slow, but recently it has been greatly accelerated. The earlier condition was due partly to the fact that, important as the matter seems to power house operators, the corrosion of condenser tubes is only a part of the general corrosion trouble. In the whole field it is of relatively minor commercial significance. If, however, iron and steel corrosion are excluded, as well as that of the alloys used in engineering structures, the waste of money occasioned by the short life of condenser tubes becomes relatively very important. In fact, it is so large as to be exceeded by few other wastes among applications of alloys in which the corrosive influence is a factor. It is worthy of careful study.

The whole corrosion difficulty has been attacked with great vigor in recent years, both theoretically and experimentally. Theories have been extensively modified and, as is generally the case where this occurs, progress in experimental lines has kept pace with the theory.

## **Electrolysis Has Been Blamed for a Great Deal of the Corrosion**

An important fact in this connection is that but a few years back many of the large steam turbine condensers were equipped with Muntz metal tubes. Another is that in the early days it was quite commonly supposed that much condenser tube corrosion was caused by electrolysis from the return current of electric railway circuits.

Expensive experimental installations were made in a few cases for the purpose of electrically insulating the condensers. Another line of experiment consisted in coupling a special motor-generator set to the condenser so that electric current of considerable magnitude would flow from the condenser shell to the tubes. This idea has been very persistently advocated in England, where it has produced the "Cumberland system" of condenser protection.

Another, and fairly recent, theory of corrosion is that electrolysis may occur without the assistance of electric currents from outside. The idea is rather that corrosion of apparently homogeneous metals occurs through

the operation of tiny local electric circuits. These may be almost molecular in dimensions. They are produced by non-uniformity in the metallic structure, or perhaps it would be more accurate to say in the metallic micro-structure to indicate the diminutive character of the action.

## **Muntz Metal Is Very Susceptible to Salt Water Attack**

It is well known that Muntz metal is attacked quite vigorously by salt water. This metal contains two constituents known as "alpha" brass and "beta" brass. Under microscope these two constituents can be easily distinguished. The "alpha" constituent is a solid solution of zinc in copper which may contain, under circumstances dependent upon heat treatment, as much as 37 per cent zinc, and which, when less than 30 per cent zinc is in the brass, is the exclusive solid solution present. It is a comparatively soft and very ductile body. The "beta" constituent is a solid solution of zinc in copper which is always present when brass contains more than 37 per cent zinc. This constituent is much harder and stronger than the "alpha" constituent but it is at the same time much less ductile.

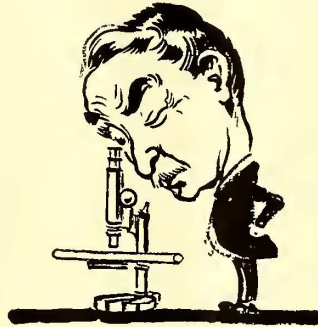
Each pair of these constituents can act as electrodes in local electric circuits when an electrolyte is present—for example, salty circulating water. These electrodes, that is the "alpha" and "beta" constituents, have very considerable inherent potential difference. There can scarcely be any doubt that this circumstance explains, for the most part, the special susceptibility of Muntz metal tubes to corrosion by salt water. This conclusion will, I believe, be supported by all who have used such tubes with salty circulating water, or certainly it will be supported by those who, having used them, have changed to Admiralty metal tubes.

Admiralty metal contains 70 per cent of copper, 29 per cent of zinc and 1 per cent of tin, while Muntz metal contains 60 per cent of copper and 40 per cent of zinc.

## **Electrolysis Theory Applies with Admiralty Metal Also**

Any brass having as much copper as Admiralty metal consists of a single solid solution of zinc in copper, that is, "alpha" brass. This is true of all brass alloys still more rich in copper.

While the electrolytic theory of corrosion still serves to explain, or at least helps to explain, the corrosion of Admiralty metal tubes and other "alpha" brass alloy tubes, it is evident that the homogeneity of the crystals of the single "alpha" solid solution is much greater than in the case of Muntz metal. The theory requires the



You knew little about your condenser tubes until the microscope told the story



presence of tiny electric currents due to lack of uniformity, but obviously the potential differences are very much less in this case than those which exist between the crystals of the "alpha" and "beta" solution of brasses having copper of about 60 per cent and zinc of about 40 per cent, of which Muntz metal is an example.

The point is often made that if 70 per cent copper is so much better than 60 per cent copper, why would it not be still better to use 80 per cent or 90 per cent copper or alloys even richer in copper than this?

There are several reasons for the use of a limited percentage of copper. In the first place, copper is more expensive than zinc, therefore the cost of the tubes rises with increasing copper content.

### Why Not Use Condenser Tubes of Pure Copper?

Another important fact, already mentioned, is that brass containing as much as 70 per cent of copper or more consists of one rather than two solid solutions; that is, the "alpha" rather than the "alpha" and "beta" metal. It follows that once the "beta" constituent has been removed there is no further improvement to be effected by the addition of more copper.

It is true, of course, that as electrolytic corrosion goes on, it is the zinc which is dissolved and the copper which remains. The honeycombed structure which is left is very weak mechanically and is broken easily by vibration. It follows, therefore, that the less zinc originally in the tubes to be dissolved, the less is the resulting weakening of the tube as it deteriorates throughout its life.

Carrying this argument to its conclusion one might ask: "If the less the zinc in the tube the longer its life, why not use an all-copper tube?" The answer to this is that the omission of the zinc would be undesirable as a manufacturing matter. It appears from the metallurgy of tube manufacture that copper oxide is produced in the making of tubes and this is very soluble in molten copper. Copper oxide in a tube is very bad. Zinc in alloying with copper takes care of the oxidizing effect.

Many engineers believe that a little zinc will perform this oxidizing service as well as a great deal and that, therefore, condenser tubes of progressively higher copper content should have correspondingly longer life up to, say, 95 per cent of copper. To offset this increasing merit would only be the corresponding higher cost.

While the above opinion seems to be quite widespread among engineers, it cannot be said as yet that the use of tubes so rich in copper has been tried long enough in a practical way firmly to establish the validity of the theory. Certainly it is not established to so great an extent as the fact that Admiralty metal tubes are superior to Muntz metal tubes for condensers with water more or less salty in character. It may be said in passing that a tube of 70-per cent copper and 30-per cent zinc composition, possessing the merit of a single solid solution, "alpha" brass, is considered less durable for salt water service than one containing a slight amount of tin, hence the popularity of the well-tried Admiralty metal. The role played by the tin in giving this added protection is, however, not well understood.

So far we have discussed the chemical composition of

tubes as affecting their durability against corrosion, but there are other factors which have an important bearing on the subject. Some of the most important work done in this line is so recent that manufacturers have not as yet had time to provide equipment to make the fullest use of it.

Before taking up this latest work it may be well to state first that for some years engineers have felt that very important influences were at work, other than variation in chemical composition, which would account for tube deterioration. These men were convinced that not much improvement was to be secured until these factors had been identified and brought under practical control.

The investigators turned naturally to the microscope to assist them, and the character of grain structure and its relation to annealing were carefully studied. The literature of this subject is now quite extensive.

In spite of all this study, however, it did not seem possible to distinguish accurately between good tubes and poor tubes. About five years ago, however, the brass industry got a very heavy "jolt" which brought about important investigations and had far-reaching effects.

On the New York State Barge Canal work, and also earlier, on the Panama Canal work, large quantities of brass and bronze were used under conditions subjecting the material to considerable stress. These materials had been chosen under the circumstances as substitutes for steel in order to insure against corrosion. The structures in which they were used were carefully designed for the applied stresses.

In no small number of cases these materials failed, causing genuine alarm among engineers for the safety of some of the structures in which they were used. The result was a decided skepticism as to the suitability of such alloys for structural purposes. In some cases steel was substituted for the alloys.

In the investigation which followed the United States Bureau of Standards took a leading part, applying its rigorous research methods to this work. The result seems to have been very satisfactory.

### What is the Cause of "Season Cracking?"

One evil to which alloys are subject, known as "season cracking," has long been widely known in the brass trade. It has seemed in some way to be connected with moisture conditions. Brass and bronze kept quite dry might be entirely free from this trouble even though long in service, whereas these alloys kept in storage and, therefore, subject to no stress at all, might give evidence of "season cracking" if subjected to moisture conditions. The failure of such alloys in service when subjected to high but carefully calculated stresses and to corrosive influences have already been commented upon.

In a general way it was known fairly accurately that "season cracking" was related to internal strains produced in manufacture and not subsequently removed. Recent investigation has clarified and amplified our knowledge of the whole subject, however, very much indeed. We now know that "season cracking" and "corrosion cracking" are one and the same. Consequently an organized effort to allow the former term to die out of use meets with no opposition.

We now know that "corrosion cracking" and initial



tensile stress are not only associated phenomena but also that without the latter "corrosion cracking" does not occur.

Initial tensile stress, which is a cause of corrosion cracking, is bound up with the matter of electrolytic solution potential. Some of the best recent research work seems to establish definitely that this potential increases continuously with tensile stress.

The way in which corrosion cracking comes about is therefore as follows: Newly manufactured metal, say brass condenser tubing, is in a state of initial stress of such nature that the surface layers are in tension. There is always sufficient lack of homogeneity on the surface to start electrolytic corrosion if an electrolyte is present. This may be assumed to be the case when the tubes are in service in a condenser.

The early surface corrosion grooves the surface and, as it is a law of mechanics that the unit stress at the bottom of a groove is far higher than the average stress over the surrounding section, the early surface corrosion produces higher unit stresses at the bottoms of the grooves as these deepen.

We have assumed a case where the initial surface stresses are tension stresses. Therefore as the grooves deepen the electrolytic solution potentials at the bottoms of the grooves increase, and as this occurs the differences of potential between the bottoms of the grooves and the general tube surface are increased. As a consequence the electrolytic corrosion is not only maintained but accelerated.

#### What Are We Going to Do About It?

Now as to some hope of cure for these ills. Initial compression unit stresses seem harmless—that is, they do not seem to favor corrosion cracking. The reduction of initial tension stresses from the high values, which are often very high indeed, is obviously a cure for the evils caused by high-tension stresses.

Either one of these conditions may be deliberately brought about by a finishing operation during manufacture. Annealing after the final drawing, with the annealing temperature kept to the low figure of 400 deg. C., or thereabouts, will completely remove the internal strain. At the same time it will produce a finely grained microstructure, completely eliminating the coarse structure which results from annealing at temperatures within or above the critical range.

This very important conclusion of recent research work will doubtless in the near future be much better appreciated than it is to-day. As yet the brass works are not generally equipped with the control apparatus needed for the maintenance of such low annealing temperatures.

As a substitute, however, efforts are being made so to spring the metal after the last drawing as to change the stresses which have resulted from cold working, from tension stresses at the surface to compression stresses. This is being done with a fair degree of success in the case of brass rods, but whether it can be done with similar success in the case of seamless tubes, the writer cannot say at the moment. In this connection, however, it must be remembered that the present advance in this field is very rapid, both in research work and manufacturing.

A very pertinent question with which to close the

present discussion is this: "What are some of the main features which are being embodied in progressive condenser tube specifications?" In answering this question it would be well to state that these features will undoubtedly become much more important in the near future, as they have for their purpose the securing of tubes which will stand difficult corrosion conditions with sufficient durability to cut down condenser maintenance costs. Moreover, they will tend to eliminate general power station troubles resulting from contaminated hot-well water. This is a very serious item of power station expense where circulating water is in any way bad.

#### Modern Condenser Tube Specifications Are Quite Comprehensive

Among the items which may well be included in these specifications are the following:

*Chemical Composition:* (a) Such as will exclude the "beta" solid-solution constituent. (b) Presence of small amount of tin (about 1 per cent) if condenser water is salty. (c) Limitation to very small quantities of those elements generally believed to be injurious, such as lead, iron, arsenic, cadmium.

*Initial Surface Stresses:* (a) Elimination of such stresses by low-temperature annealing after final drawing. (b) Creation of initial surface compression stresses after final drawing by deliberate springing as a possible substitute for (a).

*Grain Size:* Specification of grain size and enforcement of the specification by grain-size measurement, using one or another of the authoritatively recognized methods.

*Hardness:* Specification of hardness number on some recognized scale, preferably the Brinell.

#### Applying Gas Welding in the Boiler Room

IN THE boiler rooms of the Doherty properties in Toledo, Ohio, all bagged and leaking boiler tubes are being welded by the oxy-acetylene process. William Long, superintendent of production, states that as many as fourteen welds have been made on one tube before it was discarded. The process is first to heat the bag on the tube with the torch, using a slow heat until the bag is a bright cherry red. The bag is then driven back, beginning at the outer edge and working in toward the center. In case there is a hole in the bag this is first welded shut. Boiler tubes are also being reclaimed by welding sections of tubes onto damaged tubes that have been removed. The cost of welding is approximately 75 cents per single weld, including all labor, material and cost of setting up the apparatus. When several welds are made on one boiler, the cost is less.

Crystallized boiler tubes are also being successfully annealed by use of the oxy-acetylene process. The two ends are heated to a bright cherry red and allowed to cool, after which they are rerolled and given a hammer test. After treatment the tubes are found to be as soft as new ones.

The Toledo Railways & Light Company reports that by use of these methods a great saving is being made in boiler tube costs. The process is another illustration of the extent to which modern welding is being applied in all technical fields.



# Forces Acting Directly or Indirectly Upon the Truck Side Frame

By Norman Litchfield

**The Author Concludes His Series of Articles on Electric Railway Bodies and Trucks by Considering the Factors Which Affect Side Frame Design**

IN AN ARTICLE on a few of the engineering principles entering into truck design in the Mechanical & Engineering edition of the JOURNAL for July 20, certain forces were enumerated as being largely controlling. At the risk of repetition, and for the convenience of the reader these may be listed again, as follows:

1. The weight carried with car standing straight.
2. The shifting of the weight from the center of the truck partly to one side by the action of centrifugal force.
3. The shifting of a portion of the load from the rear to the front trucks by action of the brakes.
4. A similar shifting of the truck load from the rear of the truck to the front by action of the brakes.
5. Forces set up by the torque of the motor through the motor nose during periods of acceleration.
6. The so-called "flywheel effect" or tendency of the rotating parts of the truck to continue rotating during periods of retardation.
7. The forces set up by the friction of the brakeshoes on the wheels, and transmitted to the truck structure through the brake hangers.
8. The distortional effect of the horizontal force applied to one corner of the truck by virtue of the thrust of the forward outer wheel against the rail in rounding curves.

To these might be added a somewhat similar distortional effect of inequalities and depressions in the track.

## Truck Loads Are Not Uniformly Distributed, by Any Means

In considering the forces acting on the side frame and the stresses thereby induced, it is to be remembered that primarily the side frame is a beam or a truss, designed to carry a load more or less centrally applied at the truck transoms. It is supported by two abutments which as a general rule are springs, either helical or elliptic, located near or over the journal boxes.

The primary load transmitted through the transoms to each side frame is, of course, one quarter of the total car-body weight, including passengers. In the previous article on bolsters it was pointed out that the effect of centrifugal force on a car rounding a curve is to relieve the center plate of a portion of its load and to throw a corresponding load on the outer side bearing. By reason of this action the bolster no longer presses with equal force on each elliptic spring, but throws a greater

load on the outer one and so throws correspondingly greater load on the side frame at the outside of the track curve. The total load carried by the side frame between its supports consists of this eccentric load on one spring, plus a portion of the bolster weight, the weight of the spring itself plus its swing hangers, etc., and a portion of the weight of the transoms and brakebeams, motor weight, etc.

As it is desired to conclude the present series of articles on car construction with this number, it seems well to omit any detail calculations of the forces and stresses, and simply point out the general lines along which a study of design may be followed.

The effect of the centrifugal force having been covered in its relations to shifting of the load from one side of the truck to the other, the next condition to consider is the transferring of a portion of the car-body load from the rear center plate to the front. This will occur during an application of the brakes, the effect of which

is readily seen after a short study of the conditions. To make this clear the reader should be reminded that the retarding force of the brake-shoes has to be applied to the car body through the center plate, at a point about 3 ft. above the rail,



Truck parts must withstand these excessive strains from emergency stops

whereas the center of gravity of the car body and its passenger load is some 7 ft. above the rail. Consequently the effect is somewhat similar to a pedestrian stubbing his toes, causing him to fall forward.

## How the Weight Transfer Force Is Calculated

To determine what the force is which produces this weight transfer we may proceed as outlined in the following: Electric passenger cars are now customarily equipped with brakes designed to give a braking force at the wheels equivalent to about 110 per cent of the weight of the car without its passengers. That is to say, an empty car weighing 50,000 lb. would have a braking force applied in service application of 55,000 lb., or if a light-weight car, a force of 6875 lb. per shoe. This is figured with a cylinder pressure of 50 lb. per square inch. With the brakes applied in emergency the cylinder pressure increases to 60 lb. per square inch and the maximum braking force will then run up as high as 132 per cent of the light weight of the car. The pressure of the braking force applied to the shoe is, of course, radial on the wheel, and its stopping or frictional effect will depend upon the nature of the wheel and of the brake-shoe itself. But in general it may be assumed that at the speeds under consideration the maximum coefficient of friction between shoe and wheel will amount to about



0.25, thus giving a tangential frictional force of  $0.25P$  where  $P$  is the total radial braking force.

Not all of this frictional force, however, is available for stopping the forward motion of the car itself. A portion of it is used up in overcoming the stored-up energy in the rotating parts, including the wheels, axle, gears and motor armatures, which tends to keep these parts in rotation. The effect of this is especially noticeable in the case of the motor armature. This is evidenced by the fact that a truck without motors cannot successfully utilize a braking pressure of much more than 85 per cent on account of the danger of sliding the wheels under poor rail conditions. The same truck with motors can be braked up to 110 per cent as before stated. This matter is fully discussed in Richey's "Electric Railway Handbook," page 172, under the caption "Ratio of Linear Inertia to Total Inertia." In this he states that for a high-speed electric motor car this ratio will vary from 0.935 to 0.91.

If we assume that a braking force equivalent to 25 per cent of the light weight of the car is used up in overcoming the energy of the rotating parts, then with a maximum braking force of 130 per cent in emergency, 105 per cent would be available for stopping the car and, allowing 0.25 as maximum coefficient of friction between wheel and shoe, the actual retarding force becomes  $F = 1.05W \times 0.25 = 0.2625W$ .

### Retarding Force Is Divided Between Body and Trucks

The total retarding force may be considered as divided between the car body and the trucks in proportion to their respective weights. Thus if  $C$  be the weight of complete car,  $B$  that of body, and  $T$  that of trucks, the retarding force acting on the body will be  $F_1 = 0.2625 \frac{B}{C} W$ .

As before pointed out, the center of gravity of the body and passenger load is 7 ft. above the rail and the center plate about 3 ft. The onward impelling force of the inertia of the loaded car body and the retarding force applied at the center plate form a couple 4 ft. apart. If  $L$  be the distance between front and rear center plates, the downward force at the front plate caused by the turning movement of the couple will be:

$$P = 0.2625 \frac{BW}{CL}$$

This force must be added to the weight on the front center plate to give the total load carried by the front truck. Inasmuch as this force is not affected by centrifugal force of the car rounding curves, one-half may be considered as caused by each truck side frame.

At the same time that the retardation causes a downward force to act at the front center plate, a similar upward force of equal intensity is induced at the rear center plate, and thereby correspondingly lessens the load on the rear truck.

### This Force Acts Through the Center Plate Also

Another factor which may affect the load carried by the side frames is the downward force on one transom of the motor nose and a corresponding upward force on the other transom from the other motor, assuming that the truck carries two motors. Each force amounts as a maximum to about the weight of the motor itself. But inasmuch as there is little likelihood of the maximum

torque of the motors occurring at the same instant as the exertion of the maximum retarding force of the brakes, this feature may be omitted from consideration and the forces acting on the side frame be limited to those coming from the weight carried and the action of the brakes.

### Truck Is Subjected to a Turning Moment During Braking

Having given consideration to the forces acting through the truck center plate, attention must next be paid to the forces acting within the truck structure itself. The retarding force, which as explained applies a turning movement to the car body, adding weight to the front center plate and taking from that on the rear plate, also applies similar turning movements to the trucks. This tends to lift the rear pair of wheels of each truck.

Thus, the inertia of the car body applies a horizontal force at each center plate equal to one-half the force of retarding the car body (if both trucks are of equal weight), and the inertia of the truck a horizontal force

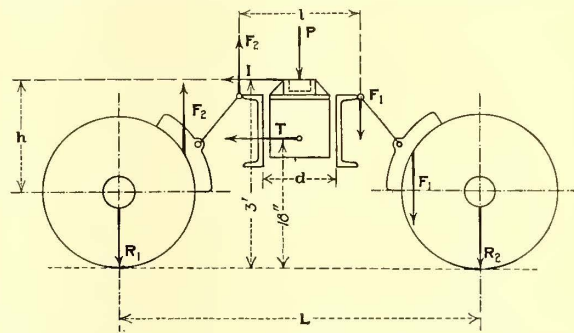


DIAGRAM SHOWING THE FORCES CONCERNED IN THE DESIGN OF A TRUCK SIDE FRAME.

at the center of gravity of the trucks about 18 in. above the rails, equivalent to the force exacted in retarding the truck.

In addition thereto, there are the vertical forces set up by the friction of the shoes against the wheels and applied to the truck structure through the brakeshoe hangers and transoms. This couple is opposite in direction to the others, tending to raise the front end of the truck and depress the rear.

### How the Several Truck Forces Combine

To make these points more clear, reference to the accompanying figure will show that the inertia of the body  $I$  exerted against the front center plate exerts a downward force at  $R_1$ , equivalent to  $\frac{3I}{L}$ , and similarly the inertia of the truck  $T$  a corresponding downward force  $\frac{1.5T}{L}$ .

The couple exerted through the brake hangers is  $F_1 \times l$  and the upward force at  $R_1$  is  $\frac{F_1 l}{L}$ .

To sum up then, the forces acting directly on the side frame at the outside of the track curve are as follows:

The load applied at the transoms consists of one-half the dead load on the center plate, augmented on the one hand by a transference of weight from the rear truck to the front by braking action, and further augmented by the shifting of a portion of the load from the center



plate to the outer side bearing by action of centrifugal force.

The vertical forces at the transoms due to the turning movement produced by the horizontal retarding force at the center plate,  $I/2$ , which is applied at a distance  $h$  above the center of the wheel. This may be taken as the horizontal point of support of the frame against retarding forces. The distance between transoms being  $d$ , the vertical forces induced are  $\frac{I}{2} \times \frac{h}{d}$  downward on the forward transom and upward on the rear transom.

The vertical forces at the transoms due to the friction between the shoes and the wheels, equal to the brakeshoe pressure times the coefficient of friction between shoe and wheel, upward on the forward transom and downward on the rear.

The algebraic sum of these forces gives the net force at the transom.

### Applying the Principles in the Side Frame Design

The side frame between supports may be treated as a simple beam and the bending moments calculated.

The stress that may safely be allowed in the side frame will depend upon the character of the structure and the service to which it is to be put. As somewhat of a guide, however, it may be pointed out that under the conditions given for the calculation, axles which are subject to the maximum of vibration and reversals of stress run successfully at stress of 15,000 lb. per square inch and over. Therefore it would seem that the side frames could also be stressed equally high. Against this, however, are the facts that passenger car axles are made of special steel designed for its exacting work, while the side frame material may be of more or less uncertain character.

Furthermore, it should be remembered that the frames are of more or less complex construction and liable to have points within where the so-called localization of stress occurs. That is to say, there may be short stretches where the stress will run very much higher than is general throughout the structure. Localizations of this character have been proved conclusively to exist in many structures by laboratory tests through the use of strain gages. These gages consist essentially of micrometers for measuring the elongation of the structure between any two points. Ascertaining the proportion of this elongation to the original length and with a known modulus of elasticity of the metal, the local stress may be calculated.

In addition to the vertical loads on the side frame attention must be given to the transverse loads due to the sidewise thrust of the outer wheels against the rails. In this case the side frame acts as a beam loaded at the middle and supported at the ends at the center lines of the wheels.

The distortional effect of the thrust against the outer wheel and also that of inequalities of the track are difficult of analysis and are generally met in the design by a proper combination of gusseting and flexibility of transom construction.

It is obvious that in the limits of these papers on car and truck construction little more than the most salient points could be covered. It is hoped, however, that they may be of service in pointing out the lines along which one interested may pursue investigations.

## Will a Cushioned Gear Save Power in Car Operation?

### The Energy Expended in Vibration and Shocks Is Commonly but Improperly Included with the Gear Losses

By G. W. REMINGTON

Assistant Engineer Division of Passenger Transportation and Housing, Emergency Fleet Corporation

THE tremendous amount of energy wasted annually in the ordinary spur gearing used in the motor car equipment of our street railways is not generally appreciated by operating men and others interested in fuel economy. This gearing universally employs the involute type of tooth, and power is transmitted through sliding contact. Friction is therefore bound to be present and every operating man endeavors to reduce this to a minimum by considering his own local conditions and by applying such lubrication as he finds practical.

The graph in Fig. 1 gives the losses in gears and bearings found as an average of many tests in which two railway motors were mounted on a testing stand, one

driving the other as a generator through standard gearing of the kind in question. It is impossible, or at least impracticable, to provide the user with gears in which the tooth pitch, profile, etc., are perfect, and as a result vibration of the entire motor is

very noticeable when commercial shop tests like the above are made. The energy required to produce this vibration is charged to gear loss and appears as such in the curve shown, though, correctly speaking, it is a loss incident to the use of gears as now constructed.

High rail joints, special work, flat wheels, poor alignment of track and normal roughness of the track itself are largely responsible for the breaking of gear teeth in service and the general deterioration of the motor equipment, the vibrations from these causes being added to those due to the gear teeth. It is therefore safe to say that the so-called gear losses when the motor is running on the road are considerably in excess of those shown in Fig. 1 even when the gears, armature and axle linings are new. When the armature and axle linings wear, and the pinion and gear centers in consequence recede from each other, and when the pinion and gear teeth wear, the efficiency of the gearing decreases in proportion so that, all told, the curves shown in Figs. 1, 2, 3 and 4 represent ideal conditions and minimum gear losses.

Fig. 2 shows the characteristic curves of a motor having a commercial (one-hour) rating of about 110 hp. and include the speed, torque and efficiency, with gears, at 600 volts. Looking at these curves, in conjunction with that shown in Fig. 1, it appears that at full load of 160 amp. the gear loss is 4 per cent or 3840 watts, the torque 2050 lb. and the speed 20.2 m.p.h. As the actual gear (friction) loss should decrease directly with the torque and increase directly with the speed, the loss at

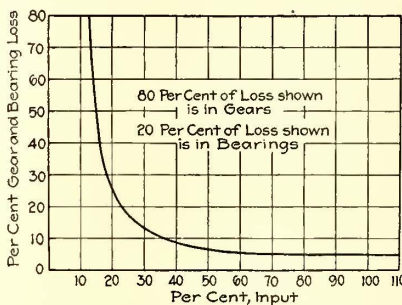


FIG. 1.—GRAPHS OF LOSSES IN GEARS AND BEARINGS OF RAILWAY MOTORS



56 amp., which is a fair estimate of the average load when the car is making a stop every 2 miles, might reasonably be expected to be about

$$\frac{3840 \times 31 \times 440}{20.2 \times 2050} = 1263 \text{ watts.}$$

This is only 3.76 per cent of the input, whereas the average of many tests shows 8.65 per cent, a discrepancy which is accounted for by the energy wasted in vibrating the motor.

As an example of what this loss amounts to, we may assume a 30-ton car making a stop every 2 miles and a schedule speed of 28.6 m.p.h. Were this car to run 90,000 miles during the year on a system where the distribution efficiency from generator bus to trolley wheel is 80 per cent, the calculated energy required at the bus is 213,000 kw.-hr. This figure drops to 190,000 kw.-hr. if the over-all motor efficiency is increased by an amount which it seems reasonable to believe would accompany the elimination of the vibration due to gear teeth alone.

Summarizing, then, the possibilities which lie along this line, it may be suggested that such a gear would: (1) Have a first cost considerably higher than the ordinary gear. (2) Prolong the life of both pinion and gear. (3) Have a replacement cost involving only the purchase of the rim bearing the teeth. (4) Be more readily substituted for a worn gear. (5) Materially increase the life of armature windings, brush rigging, and all mechanical parts now deteriorated by vibration. (6) Greatly decrease flashing at the commutator. (7) Facilitate a smoother, and therefore more rapid, acceleration and braking of the car. (8) Be quieter in operation. (9) Offer excellent possibilities of saving at least 10 per cent of the present total power input to the car, without the installation of instruments or the keeping of an additional set of records.

It is probably no exaggeration to say that were the blows to the car body not cushioned, transportation by rail would be impossible and the maintenance and depreciation of roadbed, track and rolling stock would be

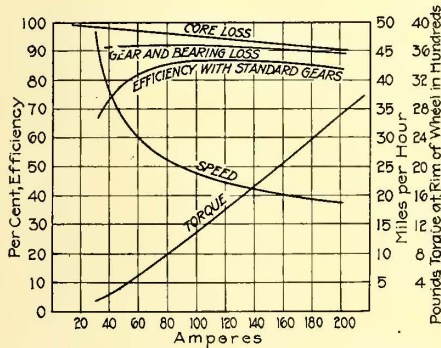


FIG. 2—CHARACTERISTIC CURVE FOR 110-HP. RAILWAY MOTOR STANDARD GEAR

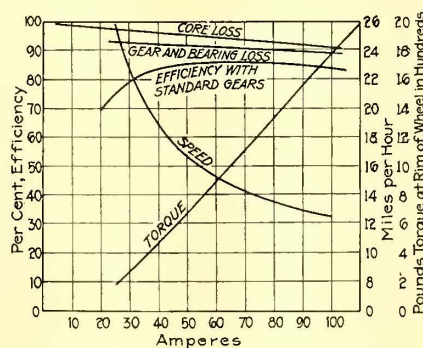


FIG. 3—CHARACTERISTIC CURVE FOR RAILWAY MOTOR WITH STANDARD GEAR

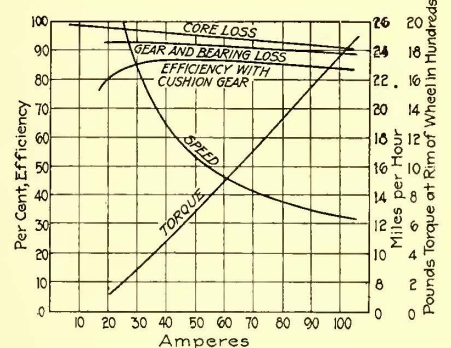


FIG. 4—CHARACTERISTIC CURVE FOR RAILWAY MOTOR WITH CUSHION GEAR

The result would be a saving of 23,000 kw.-hr., or about 35 tons of coal per year for each car so operated.

In city service the average load on the motor can be somewhat nearer full load for the reason that the time power is on is a comparatively small proportion of the total time which the motor has to radiate its heat and the gear losses are not, therefore, as large a proportion of the total input as when the stops are infrequent. We will assume a 20-ton car making seven stops per mile and a schedule speed of 10.68 m.p.h. Using the characteristic curves of the motor on 525 volts shown in Fig. 3, we see that were the motor to run 40,000 miles during the year on a system where the distribution efficiency is 80 per cent, the calculated energy required at the bus is 124,000 kw.-hr. This figure drops to 107,300 kw.-hr. if the over-all motor efficiency shown in Fig. 4 is used, thus showing a saving of 16,700 kw.-hr., or about 25 tons of coal per year for each car so operated.

It would seem that what is required is a cushioned gear. Such a gear has not been developed perhaps because operating men have failed to give the subject the consideration which it deserves. It is unnecessary to say that the spring gears now in use on certain locomotives were not employed with the object of conserving power and there is some doubt whether springs form a suitable cushion. Rubber offers much greater possibilities, both as to cost, reliability, and the characteristics which govern the amount of compression produced by a given force.

prohibitive. The facts that the railway motor is a very rugged piece of apparatus and that the vibration is not felt by the passengers are perhaps responsible to a great extent for the lack of development along this line which would appear to be well worth while.

### Axle Generators for St. Paul Locomotives

One of the features used on the Baldwin-Westinghouse locomotives being built for the heavy passenger service of the Chicago, Milwaukee & St. Paul Railway is the axle-driven generator. This was referred to briefly in the description of these locomotives given in the *ELECTRIC RAILWAY JOURNAL* of Feb. 2, 1918, page 237. There are two of these generators, mounted and geared to the trailing axle of the guiding trucks in the same way as the ordinary street-car motor. They are used for generating current for the excitation of the fields of the main motors during operation, and they are the source of power for the auxiliary motors used in driving the compressors and blowers.

These generators are regulated for a normal voltage of 100 during the period that they are furnishing current for the auxiliary motors. During the period of regeneration the voltage of the machine varies from 25 to 100 volts.

The generator fields are excited from a storage-battery circuit and the voltage is controlled by a power-operated rheostat automatically controlled during the



time the machine furnishes current for the auxiliary motors, and manually controlled by the engineer during the time when the locomotive is regenerating.

It is possible to control a train on a down grade with the power off the line, since these axle-driven generators, separately excited from a storage battery, will furnish current to drive the compressor motors, which furnish the air for the brakes. Due to the heavy grades over which the locomotives have to operate, this is regarded by the railway company as one of the important characteristics of the axle generator. The fact that the auxiliary apparatus on the locomotive is operated at low voltage, which is practically independent of the line current, is also a great advantage.

## Causes of Two Accidents

### Interstate Commerce Commission Analyzes Reasons in Last Accident Bulletin—Attention Is Called to Disregard for Operating Rules

AT A TIME like this when many new men are being added to their forces by all electric railways, special attention should be given to the prevention of accidents which are caused by disregard of operating rules.

The last report on accidents of the Interstate Commerce Commission gives accounts of two collisions on electric railways last summer. One of these was on the Washington, Baltimore & Annapolis Electric Railway on Sept. 2, the other on the Shore Line Electric Railway in Connecticut on Aug. 13. Both were serious as regards the number of persons injured.

The accident first mentioned was a rear-end collision during a fog, the trains being operated on the train order and meet-table system. The report says that the direct cause of the accident was that the crew of the following car did not operate their train under control as required by rule, and a contributing cause was the failure of the conductor on the forward car to provide protection for the rear end of the car, when operating at reduced speed. The commission calls attention to the ineffectiveness of a rule requiring trains in the same direction to keep 1 mile apart when the motorman of the following car has no means of determining the location of the car ahead. The commission also speaks of the protection offered by block signals and the importance of having special rules printed on the timetable or incorporated in a printed book rather than to post them in the form of bulletins in the trainmaster's office.

In the case of the Shore Line Electric Railway, the report says that train movements were governed over this single-track line by schedule and dispatcher's orders and regular trains were run on an hourly schedule, but this schedule was not printed—simply written and posted at the various terminals. The schedules for extra trains also were not printed but written out as occasion required and placed on the bulletin board or attached to the regular schedule as a supplement. The direct cause of the accident, according to the report, was the failure of a motorman and conductor of an extra train running west to wait at a turn-out for the arrival of an opposing train, as required by the running schedule of their trains. The motorman on the extra gave no definite explanation of why he failed to stop at

the proper turn-out but said that he was not paying attention and thought he was on a regular train, the schedule of which called for no meet at that point. The conductor seems to have been asleep when the car passed the turn-out at which it should have stopped. The commission criticises the discipline in vogue at the time of the accident and calls attention to the absence of mechanical safeguards for accident prevention.

## A-Z-U-R-I-D-E Riding Well

SINCE mid-February the public relations department of the Los Angeles Railway has been issuing fortnightly a cheery car folder entitled *A-Z-U-R-I-D-E*, with the sub-title "Facts about Street Car Service and Thoughts by the Trolley Philosopher." The philosopher in question is George Baker Anderson, who is putting a lot of zest in the work. Wherever possible the message of the railway is put over indirectly in the form of a story, as in the soliloquy of Iva Strong Huntsch on his failure to use the Safety Zone; on the passenger ahead who fumbled for change; of the passenger who also delays cars by failing to pick up his bundles in time, etc. Other pamphlets describe the rush hour, the late-shopper trouble, the woman who

# A-Z-U-R-I-D-E

FACTS ABOUT STREET CAR SERVICE  
and thoughts by the trolley philosopher

ISSUED EVERY OTHER THURSDAY BY THE PUBLIC RELATIONS DEPARTMENT, LOS ANGELES RAILWAY  
VOL. 1 NO. 4

WHEN THINGS GO WRONG

WE DON'T look upon ourselves as belonging in some realm where all is perfection. We are human, and therefore something may go wrong in the streetcar service without being brought to our notice—in spite of our most diligent efforts and the vigilance of our large force of inspectors, dispatchers and others of the operating force who are constantly on the lookout for defects and striving earnestly to remedy them with the least possible delay.

Complaints regarding any aspect of the service that are believed by patrons to be reasonable are welcomed at all times—whether they be finally found justified by the facts or not.

If your complaint is justified, you will have


tion, with possible readjustment of hours of travel, even at some personal sacrifice. Those who can should arrange to travel during the hours of normal traffic, and avoid adding to the necessary congestion during the so-called Rush Hours.


The unprecedented undertaking of this nation means more than that huge armies of men must fight on the battlefields of Europe. It means that every available resource must contribute its part toward that end. It means that the men in the trenches must have the unstinted support of the nation's wealth and energy.

Waste is a smooth pavement for the road to Destruction—waste of food or fuel, of materials that enter into electric railway construction and operation, or of Man-power.

THE PORKER

He always seeks the corner of the long seat on the side, And liberally bestows himself for comfort on his ride. He spreads his legs, and puts an arm upon the window sill, And for one fare secures two seats While riding up the hill. Meantime while I am standing in the aisle, I'm filled with bliss To see that selfish fellow with his legs stuck out





SNAPSHOT OF THE BOSS ON A COMPLAINTLESS DAY

TYPICAL PAGES FROM A RECENT ISSUE OF *A-Z-U-R-I-D-E*

gets off backward, the avoidable accident, etc. A particularly good feature is the use of diagrams to show how certain accidents occur in running after a moving car or getting away from one to be caught by another.

In addition to the pamphlets, service advertisements, accident warnings, etc., are also run in the newspapers. These announcements explain some rerouting. A particularly clever advertisement on safety was headed:

### *The ESS Sense of Safety*

Slow vs. Swift  
Security vs. Surgeon  
Sanity vs. Suicide  
Safety vs. Sorrow

Many commendatory letters and very few complaining ones have been received, indicating that the public is not averse to getting the facts.



# Why Not Use Wasted Energy to Help Heat Cars?

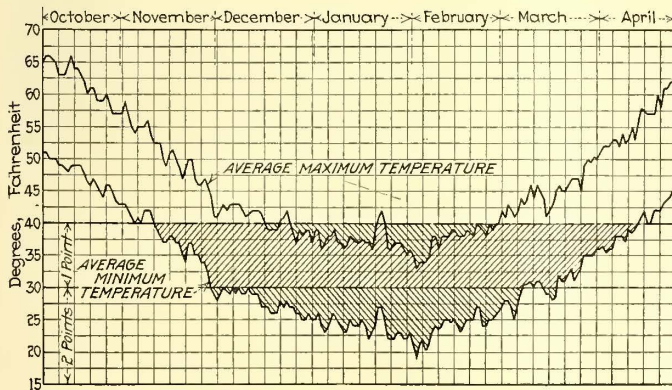
The Possibilities of Utilizing the Heat from Car Motors and Resistance Grids Are Discussed and the Results of some Tests Are Given

**I**N EXTREMELY cold weather the energy used to heat a car may amount to from one-quarter to one-third of that required to propel it. By a coincidence, this is about the quantity which is dissipated in the core and copper losses of the motors and in the resistance grids of a car in ordinary city service. The utilization of this energy for heating a car has been frequently suggested as a possible economy in car operation but the idea has never been adopted, principally, as we understand it, due to the following reasons: (1) This heat is generated spasmodically and is not readily subjected to control or regulation. (2) Heat is generated only while the car is being propelled, so that some other means to assist in heating is necessary. (3) There is danger of an offensive odor if this heated air is admitted directly to the car body. (4) The additional cost and complication involved in such an installation might offset the economy expected.

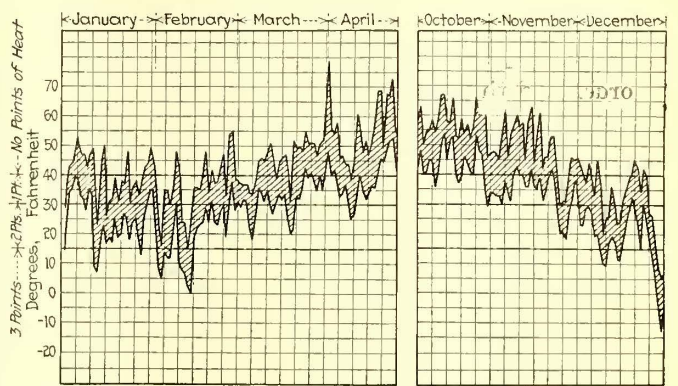
Several railway companies have conducted some very extensive tests to determine the amount of heat ob-

and third cases the resistors were mounted under the car and inclosed in a sheet-iron box lined with asbestos. The heat was conducted to the inside of the car through ducts. In one of these two cars the circulation of heat was accelerated by the use of a blower and in the other no artificial means of circulation was employed.

These results indicate that the total heat available from the resistors will give about the same rise in temperature inside the car as two points of heat from the heaters. Without forced circulation of air approximately one-half of this is lost in conducting it to the car. When the hot air is circulated by means of a blower a slightly greater amount of heat is obtained for heating but probably not enough more to pay for the extra expense of installing and maintaining the blower. The cost of boxing-in the resistors and making the necessary connections to the inside of the car varies from \$35 to \$50 per car, and where a blower is used it is about \$100 per car. The box inclosing the resistors should be arranged to be opened during the



AVERAGE TEMPERATURES DURING WINTER MONTHS FOR FORTY YEARS IN NEW YORK CITY



TEMPERATURE RANGE DURING WINTER MONTHS OF 1917 IN NEW YORK CITY

tainable from the resistance grids. The results vary widely with the service and with different motormen operating the cars, as would be expected. Table I shows some of these results, selected as representing the average from the test data available. These particular tests were made with wooden elevated cars 47 ft. long by 8 ft. 7 in. wide. The cars were operated in regular passenger service and comparisons are made for cars in the same train.

This table gives results of heating with electric heaters with one and two points of heat, and taking 8 amp. and 16 amp. respectively, and also the results of heating the cars by means of the grid resistors. Three different arrangements for heating by means of the resistors were tested. In one case the resistors were mounted inside the car so that all heat generated would be used for heating. No passengers were carried in this car but the doors were opened and closed at each stop as in regular operation. In the second

season when no heat is required and closed off from the car body. On one road making such a test the resistors were kept in service with the box closed during the summer months and no evil results were experienced from overheated resistors.

The results from these tests indicate that heat equivalent to that obtained from approximately 4800 watts with electric heaters can be obtained from the resistors. This is equivalent to one point of heat, or about one-third the amount usually available for heating when heaters are used. It would be necessary to supplement such a system with electric heaters to provide this necessary capacity, and to provide for heating the cars while standing or previous to entering service. In order to obtain satisfactory results the heaters should be automatically controlled with thermostatic regulation. In all of the tests conducted there was no noticeable offensive odor.

Efforts of the designers of control apparatus have



always been directed toward producing resistors that will run cool. If new equipment was designed with an idea of using the heat available from the resistors better heating results could doubtless be obtained.

In New York City the usual practice is to turn on one point of heat when the outside temperature falls to 40 deg. Fahr., two points when 30 deg. Fahr. is reached and three points for temperatures below 15 deg. Fahr. In order to indicate the relative amount of time that each degree of heating is required in one locality, graphs have been plotted of the average maximum and minimum temperatures during the winter season for New York City during the past forty years. In extending the average values over such a long period the high and low points are smoothed out but average conditions are indicated.

It is seen from these graphs that, if average conditions always obtained, two points of heat would meet most of the requirements, as the lowest average temperature is but 19 deg. Fahr. The heating season extends from Nov. 1 to the middle of April. Between Dec. 1 and the first week in March there would be periods when two points of heat are necessary.

Similar graphs for the maximum and minimum temperatures during the winter months of 1917 are also shown. These indicate that there were 168 days during the year with temperatures of 40 deg. Fahr. and below. During portions of twenty-four days three points of heat were required, two points for portions of sixty-seven days and but one point for portions of seventy-seven days. It is also seen that during the three winter months of December, January and February there were thirty days out of the total of

TABLE I—COMPARISON OF HEAT PRODUCED BY RESISTORS AND HEATERS IN CARS WITH SAME SERVICE

		Average Outside Air, Deg. Fahr.	Average Inside Air, Deg. Fahr.	Average Rise, Deg. Fahr.
Three cars in same train.	Car heated by heaters, 16 amp., 600 volts.....	39.2	53.5	14.3
Elevated passenger service.....	Car heated by resistors under car; no blower.....	39.2	46.2	7.0
	Car heated by resistors inside car.....	39.2	54.2	15.0
Three cars in same train..	Car heated by heaters, 16 amp., 600 volts.....	34.7	47	12.3
Elevated passenger service.....	Car heated by resistors under car; no blower.....	34.7	40.4	5.7
	Car heated by resistors inside car.....	34.7	48.3	13.6
Two cars in same train....	Car heated by heaters, 16 amp., 600 volts.....	45.9	60.3	14.4
Elevated passenger service.....	Car heated by resistors under car; air circulated by blower, two intakes, two outlets.....	45.9	55.8	9.9
	Car heated by heaters, 16 amp., 600 volts.....	35.2	48.5	13.3
Elevated passenger service.....	Car heated by heaters, 8 amp., 600 volts.....	35.2	43.5	8.3
	Car heated by resistors under car; one intake, one outlet....	35.2	42.2	7
Three cars in same train..	Car heated by heaters, 16 amp., 600 volts.....	33	54	21
Elevated passenger service.....	Car heated by heaters, 8 amp., 600 volts.....	33	47	14
	Car heated by resistors under car; air circulated by blower, one intake, two outlets.....	33	50.3	17.3

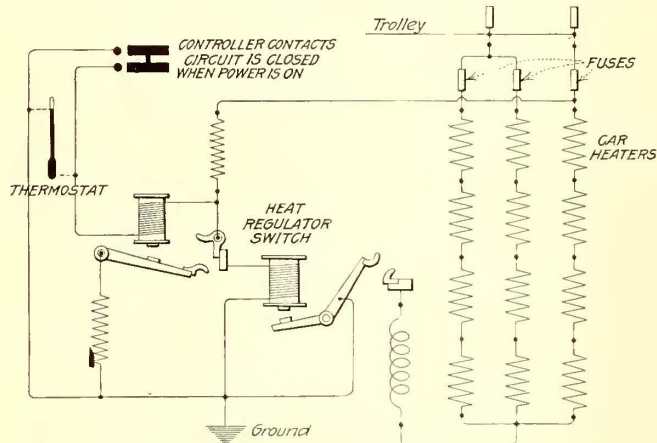
During the past winter, owing to the difficulty in obtaining coal, many electric railways cut off the heat entirely from their cars during the rush-hour peaks. The heating current load occurs exclusively in winter when both the power and lighting loads are at their maximum and the top of the peak costs most. With an idea of smoothing out these peaks the Interborough Rapid Transit Company has conducted some tests on car heating by having the heater circuit interlocked with the control connections so that heat will be on only when power for operating the car is off. As already pointed out, in this particular climate the full capacity of the heater equipment is seldom required, and by using this method the reserve capacity of the heater equipment can be turned to good advantage. An accompanying illustration shows a diagram for connecting a standard heat regulator with thermostatic control so that this interlocking is accomplished. With connections made as indicated heating current will be used only when power is not being used for operating the car and then only when the inside car temperature is below that at which heat would be cut off by the thermostat. Where thermostatic regulation is not desired the thermostat with the dotted connections can be omitted.

A comparative test made with the heater connection interlocked as described gave the following results:

Outside temperature.....	12 deg. Fahr.
Car temperature (heat on when power for operation is off)....	40.9 deg. Fahr.
Car temperature with two circuits of heaters on continuously....	49 deg. Fahr.

It is thus seen that the average temperature obtained inside the car with such an arrangement for heating was sufficient when the outside temperature was as low as 12 deg. Fahr.

The advantages of this method of interlocking the heater circuits with the car control lie in its ability to smooth out the peaks, for manifestly, if cars are heated to the same temperature in the two cases, the same amount of power will be used.



CONNECTIONS FOR INTERLOCKING HEATER CONTROL WITH CAR CONTROL

ninety on which temperatures above 40 deg. were recorded, when no heat was required. The full capacity of the heater equipment installed is thus required but a small percentage of the time in this climate.

Some tests have been made to determine the practicability of utilizing the heat from the main motors for car heating, but the results so far obtained indicate that the cost of the necessary air connection to the motors is high and that the hot air itself must be prevented from entering the car due to liability of offensive odor. In all-steel car construction there is a type of floor used with air space to provide heat insulation. The hot air from the motors could be led through this space and so aid in heating the floor without allowing the air to enter the car.



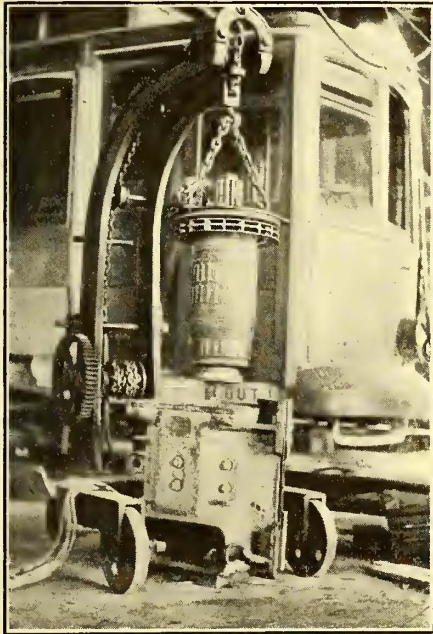
## The GE-258 Motor in the Shop

The Writer Describes the Overhauling Methods Used and the Resulting Cost, Together with Some Operating Troubles Experienced

BY WALTER FINK

Master Mechanic, Austin (Tex.) Street Railway

FOR a small railway there are many advantages in using the safety car, not the least of which is the ease of handling and maintaining the smaller and more efficient motors that go with it. We are now operating seven safety cars, all of which are equipped with GE-258



LIFTING AN ARMATURE OUT OF A BOX FRAME MOTOR BY USING A PORTABLE CRANE

motors. The simplicity of handling this motor may be judged from the accompanying illustrations, one of which shows how the armature is lifted out of the frame by means of a Franklin portable crane. The second illustration shows the armature and motor frame set up for inspection in positions which make accessible all parts of the frame, coils, wiring and brushholders.

The armature is shown resting

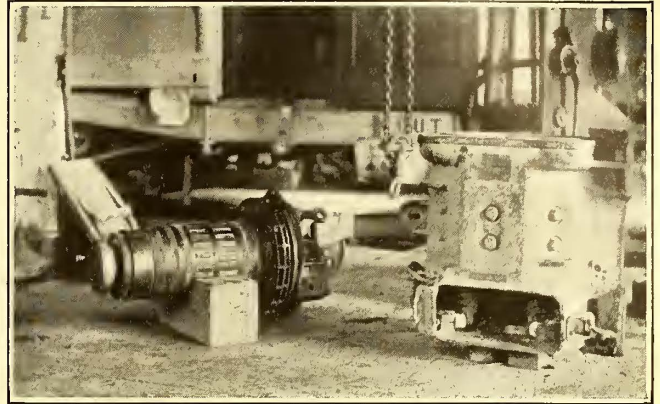
in a simple block. With the armature in this position, the pinion and ball bearings can be readily removed and replaced.

We remove the motors from the truck by means of a chain block fastened over the trap door of the car. The motors are lowered into the pit after removing the axle bearings and gear case, and then lifted onto the floor of the shop for inspection as shown in the illustrations. This operation might be simplified by means of a suitable pit jack.

The average cost of a recent inspection of our two-motor equipments was \$6.90 per car. The cost covered the work of removing and replacing the motors on the truck, removing and replacing the pinion and ball bearings, and thoroughly washing the latter in gasoline. We endeavor to give our motors an inspection every six months, in order to watch the service they are giving. However, it should not be necessary to inspect them oftener than once a year.

Operating troubles of this motor have proved gratifyingly small. Owing to the small clearance of the motor above the paving, holes were knocked or worn in the gear case, with the consequent intrusion of sand and grit. This condition, of course, is simply a question of better paving or a larger diameter car wheel. The earlier design of the GE-258 motor as used by us was also subject to loosening of the retaining collar which

holds the pinion-end bearing. The collar was screwed on and held in place by means of a locking spring. Sometimes the pin of the locking spring broke and fell out, allowing the collar to unscrew. While the pinion prevented the collar from unscrewing entirely the ball bearing would get loose and be subject to accident. Both ourselves and the maker have cured this defect by



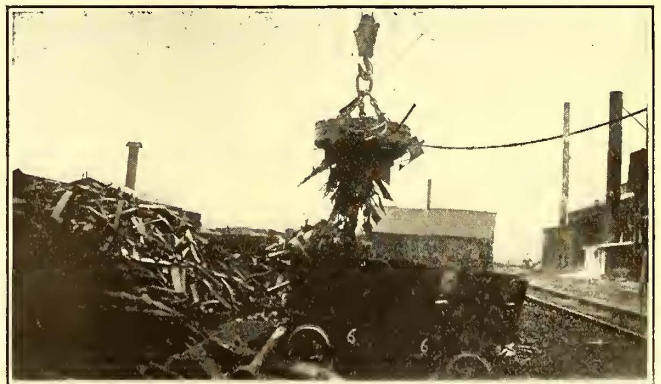
ARMATURE SUPPORTED BY BLOCK AFFORDS EASY ACCESS FOR INSPECTION

shrinking instead of screwing the retaining collar onto the shaft.

We have not had to rewind a single armature. The first pinion was not removed from these motors until it had given 100,000 miles wear, or three times the wear with older motors on our property. Our experiences in studying the wear of the ball bearings of these motors will be considered in another article.

## Lifting Magnets Aid in Loading Cars

A LIFTING magnet conforming in general to the accepted standards of construction but with several improvements has been placed on the market by the Ohio Electric & Controller Company. The height of the magnet is but slightly more than 8 in. and the parts are bolted together with heavy chrome-vanadium steel studs having nuts on top of the case. These nuts are protected by ribs raised from the outer rim, and heat



LOADING SCRAP MATERIAL WITH A MILL-TYPE LIFTING MAGNET

radiating ribs have also been added to the top and bottom. The wires leading to the coil have been securely anchored to the case to prevent them being pulled loose and grounded and they are also provided with flexible protecting armor. The connections are welded directly to the coil. Asbestos insulation is used throughout.



# Emergency Auto-Ladder Truck Used in San Francisco

## Provision Is Made for Carrying All Necessary Tools and Equipment as Well as a Crew of Ten Men

BY S. L. FOSTER

Chief Electrician United Railroads of San Francisco

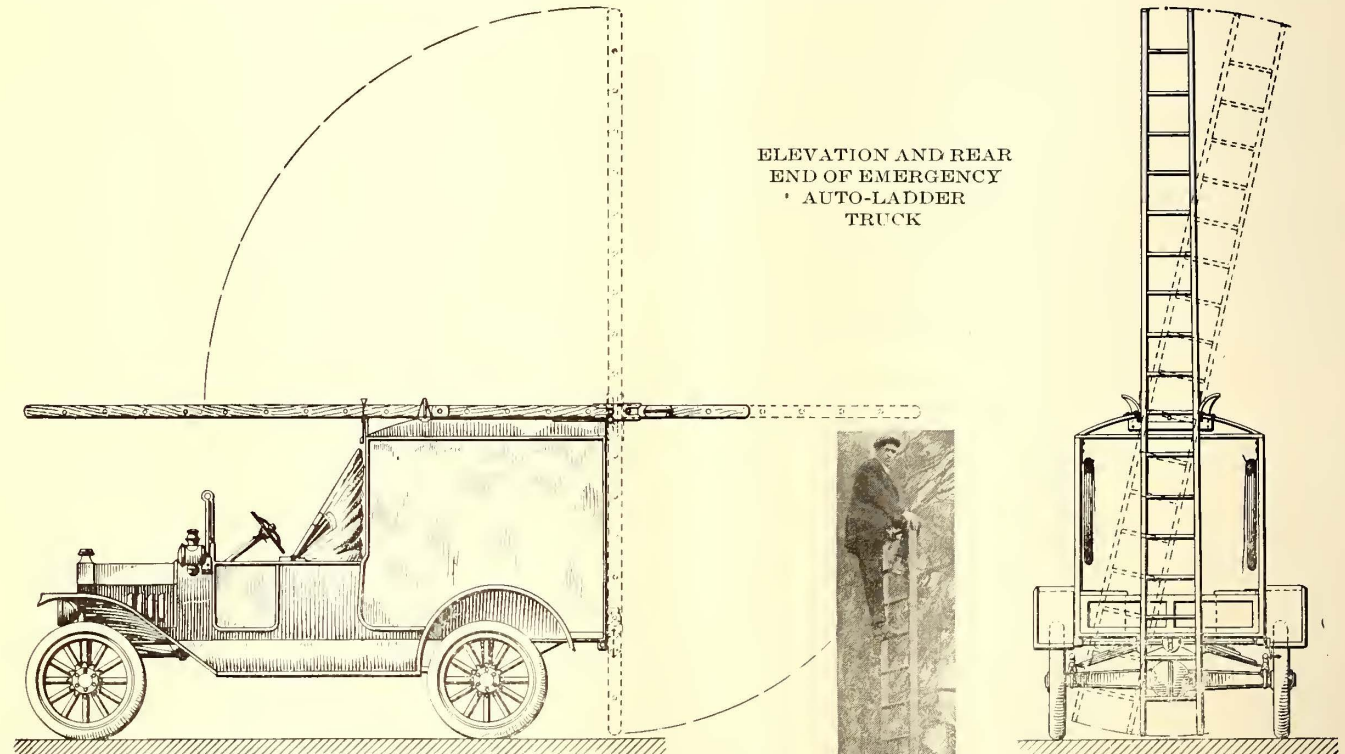
WHILE the use of a hinged ladder on a roofed vehicle for emergency line repairs on electric railroads is not new, the details of its application by the United Railroads of San Francisco may be interesting.

The accompanying illustrations tell the story. The chassis is a six-cylinder Haynes with pneumatic tires. The vehicle was otherwise built in the company's shops.

When on the way to the job the ladder lies flat on the roof with one end flush with the front of the headlights and the other extending slightly over the rear. There is thus little or no danger of this projecting ladder striking other vehicles. The ladder is held firmly in this position both on top and on the sides by a pair of hinged

spring hooks until it is desired to raise it to the erect position. Then both hooks are pulled apart by the chauffeur and the ladder is pushed up above them. At the same time the ladder is pushed backward until a pin on either side engages the jaws of the hinges on the rear end of the roof. The parts of the ladder are then so nearly balanced on either side of the hinge that it is readily raised to an erect position by a slight pull on the projecting rear end, and is fastened by a movable latch on the body of the truck below the floor level. If the work to be reached is directly overhead the workman can at once climb the ladder. If the work is located to one side of the center of the truck and at a point inaccessible with the ladder erect, the ladder can be thrown over at an angle to reach beyond the side of the car by means of a worm attached to the latch actuated by the crank seen at the rear of the truck in the illustration with the ladder erect. This is also shown in outline drawing of this truck. The top of the ladder is provided with an iron strap permitting a short extension to be added to it if additional height is needed.

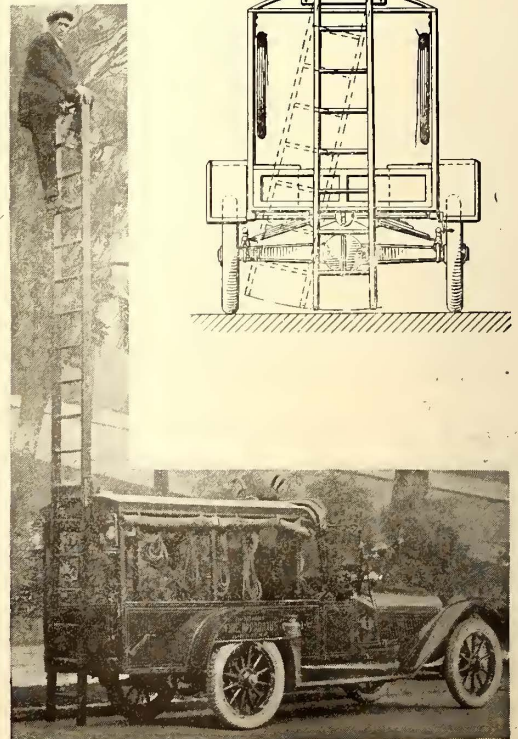
The vehicle is roofed over and provided with side



ELEVATION AND REAR  
END OF EMERGENCY  
AUTO-LADDER  
TRUCK



EMERGENCY AUTO-LADDER TRUCK READY  
FOR SERVICE



EMERGENCY AUTO-LADDER TRUCK  
WITH LADDER RAISED



storm curtains for use in rainy weather. The "Auxiliary Fire Apparatus" sign, the portable fire extinguisher and the siren secure for it a clear path on the streets and the Haynes six-cylinder equipment provides ample speed to reach the scene of trouble promptly. Forty miles per hour is often exceeded on outside boulevards. The ladder can be raised in five seconds after the auto stops.

In lowering the ladder, it readily drops in between the large hooks and is drawn ahead until the catches on the sides slip behind the hooks as the auto pulls out of the track. These features can be more readily noted in the accompanying illustrations.

This emergency outfit is provided with the usual equipment of ropes, blocks, come-alongs, splicers, tools and materials for making repairs to the overhead wires, electric track switching devices, block signals, sectionalizing switches, lamp clusters, etc. Its long body furnishes ample room for transporting a crew of ten men, the tool and material bins serving for seats. The space between bins is ample for carrying tools for digging, and for raising, moving and straightening poles, and stretchers or extension ladders as the exigencies of the case may require.

The truck is also provided with a drawhead in the rear whereby light vehicles like a trolley-wire two-wheeled gig or a light derrick wagon or ornament-hoisting wagon can be towed to the scene of the trouble.

The truck has an electric self-starter, electric head and tail lights and a speedometer, a spotlight in front, a mirrorscope or safety mirror for watching the rear, and an extension ladder strapped to the ceiling of the roof. Two men usually respond to calls in this machine, although one man could handle most cases.

## Shopwomen Doing Good Work in Quaker City

**Female Workers in the Philadelphia Rapid Transit Shops Wash and Paint Cars, Wind Armatures, Run Drill Presses, etc.**

LIKE all of the other established industries located in munition manufacturing, shipbuilding or other war industry districts, the Philadelphia Rapid Transit Company has been hard hit in the repair shops in the matter of labor. To replace the workers drawn away by the high wages offered in the manufacturing plants new workers have had to be employed. Hence, as about the only existing reserve in this line is female labor the introduction of the shopwoman on a considerable scale has been the result.

The Philadelphia Rapid Transit first began taking on women workers just before the holiday season of 1917. At first they were put at small-coil winding in the large Kensington Avenue and Cumberland Street shops of the company. These shops are not simply operating or maintenance shops, but are the main repair shops. The repairs made here are not of that class sometimes called "running repairs" but correspond rather to the "back shop" work of a steam railroad. To illustrate the variety of work in which the women are engaged, the following may be mentioned: One woman is engaged in the painting of destination and route signs and all other lettered or stencil notices which permit the

use of the ordinary paint stencil. Another varnishes the window sashes, shutters, doors and other light parts of the cars. The paint and oil spots are removed from the windows of the cars coming out of the paint shop by women workers. In the machine shop they are now operating drill presses and the company expects to put women workers on lathe and shaper work as soon as opportunity offers. In the winding department the greatest number of female workers are to be found. Practically all of the coil winding and taping is done by girls as well as a large amount of armature winding including the winding of armatures of the elevated car motors.

### WOMEN EXCEL IN PREPARING CARS FOR THE PAINT SHOP

In one type of work, women workers seem particularly to excel. This is in scrubbing and cleaning car interiors preparatory to painting and varnishing. This kind of labor was always shunned by the men and it was difficult to employ men who would do this work in a satisfactory manner. Women, however, take to the work readily.

In all the work in which they have been tried out so far they have given satisfactory service, doing not only better work, but more of it than the men and boy workers formerly employed. About eighty-five women and girls are employed in the shops at present. Practically all the work is on a piece basis and conditions are very similar to those in a manufacturing plant. The working day is nine and three-quarter hours in length except Saturday on which it is five and one-quarter hours. Thus the weekly work time is fifty-four hours.

### THE WORKING CONDITIONS ARE THE SAME AS FOR MEN

The women are paid the same rate as the men for similar classes of work and are in general put on the same working basis. Special facilities, of course, have been provided for them in the way of rest and wash rooms. A standard working uniform for the female worker has not been adopted, but suitable "all-over suits" costing \$1.50 are bought by the workers at local department stores. The piece rates at which they are paid would, in terms of hourly rates, range from 27 cents to 33 cents per hour. The workers, depending on their experience and the kind of work, make average weekly wages ranging from \$16 to \$22, while some of the more proficient, of course, exceed these averages. It is noticeable that the younger women prefer the winding and machine shop work, while the older ones, who would normally do scrubbing in hotels or office buildings, apply for the car cleaning work. So far the company has had no difficulty in getting women workers as fast as needed to fill gaps in the shop force.

The women are proving steady and willing workers, asking for "time off" no oftener than the men. They learn very quickly. Probably one of their greatest faults is the tendency to become discouraged if they do not master completely a new operation the first day they work on it. In general, however, their work has been very satisfactory and the company is gradually increasing both the number employed and the diversity of the employment. Time is kept by their signing "in" and "out" with the gateman at the shop entrance.



# A Track Puller for Paved Streets

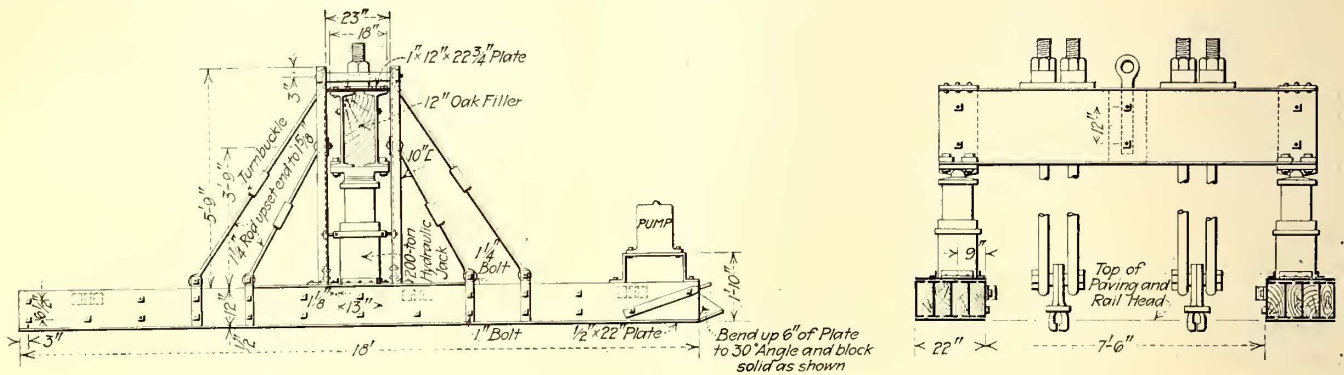
**A Machine Used By the Los Angeles Railway Makes Rapid Removal of Tracks from Paved Streets Possible**

BY THOMAS W. BULPIN  
Chief Engineer, Los Angeles Railway

THE standard type of railway construction for paved streets for urban and interurban lines, usually consists of high groove or girder rail paved with cement concrete and often with a cement grouted base or ballast. The placing of these tracks in city streets is sufficiently difficult to tax the ingenuity of most construction men when present traffic and service condi-

straddle the track as shown in the accompanying illustrations. These beams prevent the breaking of the pavement outside of the railway strip. The rail tongs are made to fit the special section of rail upon which work is being done. Although our practice has shown that there can be considerable leeway in this regard, the jacks are placed directly under the beam from which the rail tongs are suspended.

The preliminary work necessary consists of cutting out sufficient paving along the rail to permit of the placing of the tongs under the ball of the rail. This must be done at intervals of 10 ft. to 20 ft., depending upon the construction of the track to be pulled. The jacks are started and a lift of from 6 in. to 9 in. is sufficient to



DETAILS OF TRACK PULLER

tions are considered, and the officials of the roads have been looking forward with real apprehension to the time when these same tracks must come out.

About eighteen months ago our company constructed approximately 700 ft. of double track in paved streets. The rail was P. S. Co. No. 292 section, 7 in. high and weighing 116 lb. to the yard. This rail was laid on 6-in. x 8-in. x 6-ft. redwood ties spaced 20-in. centers. These ties were placed on a 6-in. crushed rock, cement grouted ballast and the entire rail paved in with cement concrete, making a solid concrete pavement 19 in. in thickness. This particular portion of track was part

pull the rails entirely free from the ties and thoroughly break the concrete within the railway strip. This operation, including the moving of the machine, requires from four to six minutes.

The machine is moved along the track with an electrically operated Brown-Hoist crane, the operation consisting of raising the puller a few inches above the pavement and moving it entirely suspended to the next position.

We have found it desirable to follow immediately behind the machine with two 15-ton hand jacks, as this facilitates the removal of concrete and paving blocks.

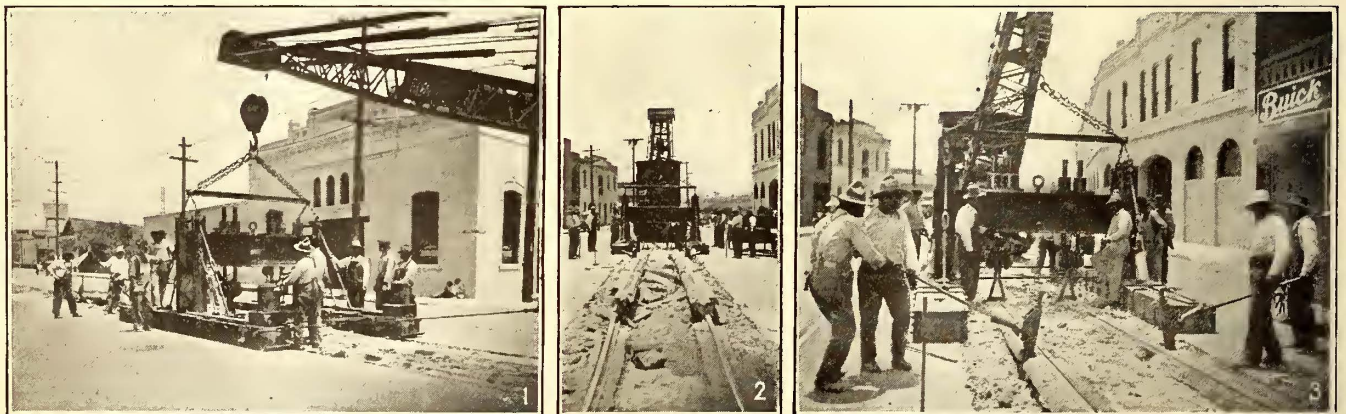


FIG. 1—PULLER IN POSITION READY TO PULL TRACK. FIG. 2—CONDITION OF TRACKS AND PAVING AFTER PULLING THE TRACK. FIG. 3—HAND JACKS USED TO REMOVE BROKEN CONCRETE

of a line recently abandoned by the company, and under the abandonment proceedings was required to be removed within a time limit.

To remove these tracks the company designed and constructed a machine which consists of two 200-ton hydraulic jacks, mounted on horizontal beams which

As yet we have prepared no comparative estimates of cost, but we find that we are able to pull out about 120 lineal feet of track per hour. We have estimated that with this machine and six men, we can remove more track than we could with 200 men under the ordinary method of sledging and gadding.



## Pacific Electric Adopts Flood-Control Measures

Shifting of Stream Beds Furnishes Difficult Problems for the Way Department of This California Company

By CLIFFORD A. ELLIOTT

Cost Engineer, Maintenance of Way Department, Pacific Electric Railway, Los Angeles, Cal.

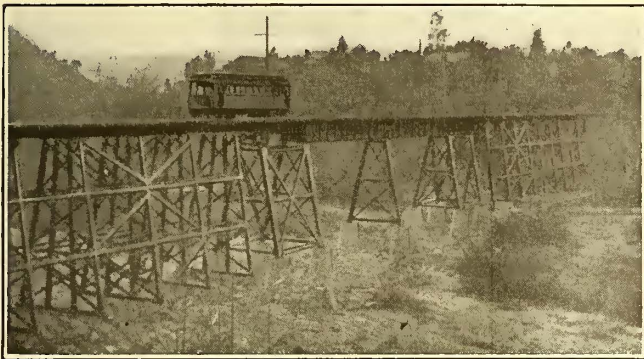
**B**ETWEEN 1905 and 1910 the Pacific Electric Railway in southern California completed some of its most important double-track lines. These ran through localities where it was necessary to construct many pile trestle bridges across streams and in some instances across dry washes or old channels which are often flooded by the heavy spring rains.

The bridges were located as nearly as possible at right angles to the streams, as these flowed at the time of construction; in many cases, however, the shallow and sand-shifting beds have caused the main channels

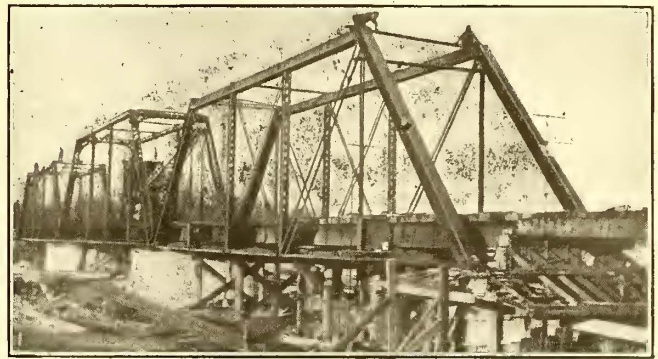
to obtain in the open market second-hand steel spans which have proved too light for the latest type of heavy locomotives now in use on steam roads but which are desirable for interurban electric lines.

When altering the bridges in the manner outlined, the double track at each end of the bridge is connected by a switch layout for single-track operation, and an all-electric automatic block signal layout is installed for operating the single track over the bridge. Four signals in all are required for the operation of the single track over the bridge, one being a distant signal and one a home signal. Small back-up, two-position light signals are also placed. One set of signals controls operation from the inbound track onto the single track, while the other controls similar operation onto the outbound track.

This program of improvement in the interest of flood control, as initiated by the company some two years ago, is approved by various flood control and drainage committees, while the State Railroad Commission is favor-



SINGLE-TRACK TRESTLE WITH STEEL SPAN BRIDGE ACROSS ARROYO SECO



SINGLE-TRACK STEEL BRIDGE UNDER CONSTRUCTION ACROSS THE SANTA ANA RIVER

to change from season to season. The flood control boards and the various county engineers are now endeavoring to remedy this situation.

Frequently six to eight bridge bents have been damaged or carried away by the uncontrollable flood waters, and in one or two instances that portion of the double-track pile trestle nearest the stream has been entirely carried away. This necessitates temporary repairs being made immediately to keep the bridge in safe condition for operation until permanent repairs or reconstruction can be undertaken.

In reconstructing these bridges the timber structure is replaced with steel-span type where possible. In the interest of economical reconstruction, and to minimize future maintenance expense, either the outbound or inbound double-track trestle is sometimes abandoned, depending upon which trestle is most in need of general repairs, and only a single-track bridge is left over the stream. In such reconstruction, steel spans are placed over the main channel only, the balance of the structure being reconstructed as a timber trestle. At the same time it is strengthened to provide for handling the increased heavy freight and passenger traffic and the increased weight of added equipment.

The average length of such steel spans is from 50 to 100 ft., and they are placed either on concrete footings, concrete piers or steel supports. Usually two or three steel spans will clear the average channel. Where practicable, and in the interest of economy, efforts are made

able to such steps as the company has taken to protect the interests of the outsider as well as that of the company.

The accompanying illustrations show new steel bridges recently installed in reconstruction work on the company's lines. One spans the Arroyo Seco on the South Pasadena line near the famous Cawston Ostrich Farm. This bridge, as reconstructed, is 761 ft. long and 40 ft. high, and consists of 593 ft. of single-track standard frame trestle, two 60-ft. deck-plate steel girder spans, and two 24-ft. deck-plate girders on steel towers, a total of 168 ft. of single-track steel span structure. One view shows a steel bridge on the company's San Bernardino-Redlands line, spanning the Santa Ana River. Three 100-ft. single-track combination truss spans on cylinder piers were replaced with three common standard 100-ft. single-track pin-connected truss spans on concrete piers.

As mentioned in a recent issue of *Revue Générale de l'Electricité*, the Swiss Association of Electricians has appointed a committee to study, in conjunction with the Swiss Society for the Gas and Water Industries and the Union of Secondary Railway Lines, the subject of electrolytic corrosion of underground conductors by return currents. The association has just approved two reports from its general secretary, one on the present status of the corrosion question, the other on some cases of corrosion in Switzerland.



## More Than Recommendation Needed

Frank Putnam, of Milwaukee, in Open Letter to Messrs. Elmquist and Eastman, Urges Federal Action Rather Than Suggestion

FRANK PUTNAM, of the Milwaukee Electric Railway & Light Company, has addressed an open letter to Charles E. Elmquist, president National Association of Railway & Utility Commissioners, and to Joseph B. Eastman, chairman of the special war committee of the association. The subject of Mr. Putnam's letter is the communication which these gentlemen sent to the President under date of July 30 and mentioned on page 208 of the issue of this paper for Aug. 3, urging the appointment of a federal administrator with "power of recommendation, advice or request to the state and municipal authorities" on electric railway rates. Mr. Putnam's letter follows:

I have read a copy of your letter, addressed to the President, suggesting the appointment of a National Administrator, or board of three, "with power of recommendation, advice or request to the state and municipal authorities," as a means of establishing, for the period of the war, street and electric railway rates adequate to assure continued and efficient operation of these railways.

It is apparent to me, as a close student of the American street railway business for several years past, that your letter to the President fails to present to him certain facts which he and others who may have to deal with your proposition should know. In order to get these missing facts to the President and his advisers, and in order to give you opportunity to answer any statements I shall make, I write this open letter to you, sending copies to the President and to others by whom he may be guided, and to the press.

The facts to which I call particular attention are these:

First: The street railway business in the United States, as a whole, is at the verge of bankruptcy. This fact has been painfully apparent to men engaged in the business during the past two years, although many members of the state public service commissions have been slow to see it. It is brilliantly and truthfully made known to the general public for the first time in an article published in the current number of *Collier's Weekly*.

Second: The street railway business of the United States is in this condition chiefly because state and municipal regulation has strangled it by fixing fares too low to permit the business either to pay good wages, or to supply adequate good service, keeping pace with increasing public requirements, or to pay investors a fair return on their savings engaged in the industry.

Third: Your proposition that the suggested National Administrator, or board of three, should be given only advisory powers, and that war relief of revenue for street and electric railways shall remain as now subject to determination by state and municipal authorities, affords no guaranty that these railways will get the relief they desperately need and which public welfare requires that they shall obtain, in time to make them more efficient contributors to the nation's war program, or to save their investors from further vast, unmerited losses. Your suggestion that the National Administrator's requests for relief of street and electric railways during the war would be "almost uniformly" granted by state and municipal authorities must be measured against the last ten years' record of state and municipal authorities. What is that record? They have imposed rate and service limitations which have brought the industry to the verge of bankruptcy. They have condemned street railway employees to low wages and long hours. They have subjected street railway investors to the unjust loss of millions of dollars legitimately invested to serve the public. They have compelled the public to put up with service which in kind and quantity was and is grossly inadequate to public needs.

Your statement that the state commissions "have with few exceptions acted favorably upon meritorious applications for rate increases for the war period"; that the state commissions are "keenly alive to the emergency which confronts these utilities, and have proved a readiness to act promptly in giving necessary relief"; and your expressed opinion that "no joint complaint could be made, by utilities or others, as to the action taken by state commissions in dealing with these matters during the war" is, I must believe, a sincere expression of your belief. I must add, however, that it challenges squarely the judgment of ninety-

nine of every 100 men actively engaged in the street and electric railway business during the war period.

Fourth: Your suggestion that the National Administrator should depend upon the state commissions "for all purposes of inquiry, investigation, ascertainment and report of facts, and co-operation in recommendations" for revenue relief, and that the granting or withholding of such relief should continue to be as now at the option of the state commissions, impresses me as being substantially a proposition to leave the whole issue of relief in the hands of the local agencies whose policies during the past ten years have chiefly created the present alarming condition.

Fifth: It is the firm conviction of the ablest and most public-spirited men in the street railway business that if revenue relief under war conditions is to reach this business in time to make it a fully efficient factor in winning the war, such relief must be granted by the federal government under its general war powers. And these men believe that if the federal government assumes to act in the premises at all, it should prepare to act with the promptness and authority requisite to save the industry from further imminent loss of efficiency and from further ruinous depreciation of its plant and business values.

Sixth: Your contention that street railway fares fixed in franchise ordinances enacted years ago and now inadequate, should not be changed to save the solvency and efficiency of the street railways, except after "the merits and equities of the particular situation" have been "weighed and determined by those most competent to know of them and to deal with them," impresses me as being substantially an argument that the federal government shall waive the nation's war need for efficient street railway service and shall stand aside helplessly while the local street railway baiters proceed with their hitherto politically profitable occupation, and while fee-hungry lawyers continue to involve the whole subject in money, time and service-wasting technicalities.

Your assumption that street railway franchises are "often priceless" amazes me, in view of the fact that the state commissions were created to squeeze all "franchise values" out of street railway rates and revenues and have done it most thoroughly. You must be aware, although you seem for the moment to have forgotten it, that street railway franchises—otherwise than as permits to engage in business for stated or indeterminate periods (and to do so under state and municipal regulation of rates, earnings, service accounting, capitalization, etc.)—have for years past possessed neither earning nor sale value to the street railway companies. Indeed, most of the franchises, because of the costly requirements which they impose upon the companies, are now listed not as "priceless" assets, but as grim liabilities.

In the large majority of the states whose public service commissions regulate the issuance and sale of street railway securities, none, as you are aware, can be issued upon franchise values. Securities issued upon franchise values in the years prior to state regulation, when such values were legitimately sold by cities and legitimately bought by companies, have with few if any exceptions been disregarded by state commissions in appraising the values upon which the companies are permitted to entertain the hope, in recent years illusory, of earning a fair yearly net income. It has happened, as you must know, that in some instances companies which purchased franchises then believed to possess large value, and which companies during subsequent years paid millions of dollars of franchise-value taxes (over and above their fair share of property and business taxes), suffered the confiscation of such franchise values without a penny of compensation, in the laws creating the state commissions.

I as strongly as any man oppose the unnecessary extension of federal authority over new areas of American business. I as strongly as any man believe in the theory of local self-government and in the local regulation of businesses which partake of a public character. I almost alone among street railway men believe that in times of peace the adoption by street railways of a vigorous merchandising policy would quickly silence professional agitators against the business and procure just treatment from state and municipal authorities. I have that firm faith in the American public's instinct for fair play and in the power of an aroused public opinion to enforce justice.

But we are at war, and in the words of the late President Cleveland, "It is a condition and not a theory which confronts us" in the street railway business of the United States. The condition is so grave, both financially and industrially, that it is an appreciable menace to the nation's war efficiency. It is a condition which the leaders of the industry believe can be effectively remedied only by prompt and forceful federal intervention. These men see no hope in your proposal to refer this condition back for treatment by the agencies which produced it.



There may be some question as to the federal government's legal right so to intervene. There is no question, in the minds of men best qualified to offer counsel, as to the federal government's power and its duty to intervene.

Finally—and you must pardon me for writing with entire candor—I am impressed with the probability that your want of such complete and exact knowledge of street railway needs as can be obtained only by sharing the labors and responsibilities of the business, together with a not unnatural desire on your part to retain the prerogatives and perquisites of your official positions, has perhaps led you to underrate the importance of making the street railway systems of the country fully efficient for war service and to overrate the importance of retaining in public control of the business those state and municipal agencies whose narrow, unbusinesslike, illiberal and too often politically-motivated policies are chiefly responsible for the present street railway crisis.

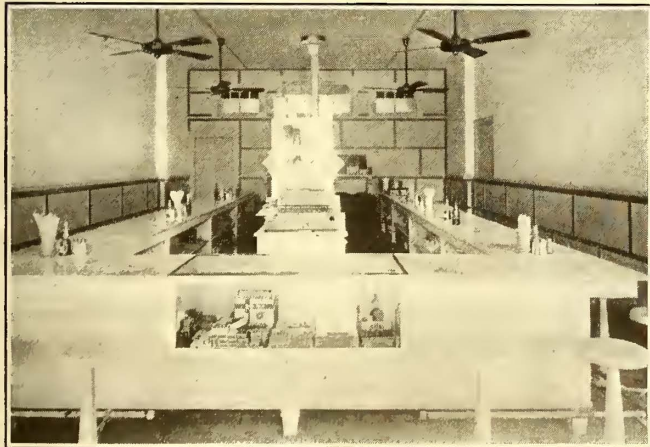
### Mr. McAdoo Denies that Government Plans Railroad Electrification

**I**N AN INTERVIEW which Mr. McAdoo gave to the daily newspaper men on Aug. 12, following his two months absence from Washington, he was quoted in some of the papers as suggesting that probably electrification would be actually undertaken while the government has control of the railroads and that the problem would be attacked at the most favorable points in the country where the static value of unused water powers was most obvious and the cost of changing from steam to electricity was comparatively slight.

When this statement was called to the attention of Mr. McAdoo by the Washington correspondent of the *ELECTRIC RAILWAY JOURNAL*, it was stated that while Mr. McAdoo had briefly discussed the conservation possibilities of unused water powers with the newspaper men and the use of such power for railway operation, he had not forecast the possibilities of such electrification while the railroads were under government control.

### Railway Restaurant Opened at Fort Worth

**T**O CONSERVE the health of its men and to save them money in these days of skyrocket prices, the Northern Texas Traction Company, Fort Worth, Tex., opened a high-grade restaurant near its East Front car-



ATTRACTIVE INTERIOR OF NEW FORT WORTH RESTAURANT

house. The fittings are extremely durable, neat and handsome. The counters are topped with marble, and the twenty-eight stools are finished in porcelain. It is planned to sell to the men at discount, while outsiders who wish to do so can use the restaurant by paying full prices. The cost of outfitting totaled \$3,000.

## Mitigating Inductive Interference

### Leading Telephone Engineer Summarizes the Situation With Respect to Communication Disturbances Caused by Alternating Current Railways

**I**N A comprehensive paper read before the Philadelphia section of the American Institute of Electrical Engineers, H. S. Warren, electrical engineer American Telephone & Telegraph Company, gave details of the measures which have been taken on all of the principal railroad electrifications to minimize interference with telephone and telegraph communication. The paper has now been published by the Institute.

After outlining the fundamental principles by virtue of which interference with communication of circuits is caused, Mr. Warren said that alternating-current electrifications cause disturbances principally by electro-magnetic induction. The reasons for these disturbances are: (1) The railroad trolley current is large; (2) it is all residual current, and (3) the railway circuit from its nature and use is more subject to abnormal conditions, such as short-circuits, than ordinary power transmission lines.

Some of the ways in which disturbances manifest themselves in the telephone and telegraph plant may be classified as follows: (1) Interference with operation, such as interruption of service, false bell ringing, noise and interference with telegraph signals. (2) Physical injury to plant involving fire hazard and magnetization of loading coils. (3) Hazard to employees and to telephone using public including danger of electric shock and acoustic shock.

Among precautionary measures on the part of the communication companies are: Avoidance of "parallels," use of neutralizing transformers and drainage coils, sectionalization of telephone circuit, use of shielding conductor, resonant circuits and relay sets, balancing and insulation of telephone circuits and "biasing" of bells. The railway companies have used the double trolley, frequent power supply stations, sectionalization of trolley system, opposing polarities, application of balancing and booster transformers, etc.

After giving specific instances of the situation on the New York, New Haven & Hartford Railroad, the Norfolk & Western Railway and the Pennsylvania Railroad (Philadelphia-Paoli line), Mr. Warren gave these conclusions: Wherever alternating railway current can be kept sufficiently within control, except under abnormal conditions, means are now known whereby substantial interference with neighboring communication lines can be avoided, although the application of such means to the extent necessary may involve considerable expense. Even under abnormal conditions the interference can be greatly reduced by the application of suitable measures, but in some cases there still remains the problem of obtaining a sufficient reduction without incurring excessive cost. It is important in each electrification project that the railroad company and the communication company co-operate in determining what interference preventive measures shall be adopted. Each electrification requires a special study, as the best measures may be different in different cases. Railroad companies and electrical manufacturers have co-operated heartily with the telephone companies in searching for a satisfactory solution of this problem, a work which is still in progress.



# News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

## "H" System Troubles

Confusion Follows Initial Separate Operation of New York's East and West Side Lines

For about two weeks the subway system operated by the Interborough Rapid Transit Company, in New York City has been divided into two sections, the east side and the west side systems. The completion of the Seventh Avenue line and the Lexington Avenue line made this division possible. The principle underlying the present plan is that the streams of travel from the lower part of Manhattan Island to the west side and Washington Heights section and to the Bronx section, respectively, shall be separated as much as possible so as to avoid congestion.

Provision for connection between the two main lines is made by utilizing the section of the original subway on Forty-second Street between Times Square and Grand Central Terminal as a shuttle line.

Shuttle service on Forty-second Street was attempted on Aug. 1, as stated in the issue of the ELECTRIC RAILWAY JOURNAL for Aug. 3, page 208, but owing to the fact that the construction of the transfer stations was not complete, and further because the public seemed not to be fully informed as to the *modus operandi*, the congestion was so great that the service had to be discontinued temporarily. The stations are now in process of modification, and shuttle service will be resumed as soon as practicable.

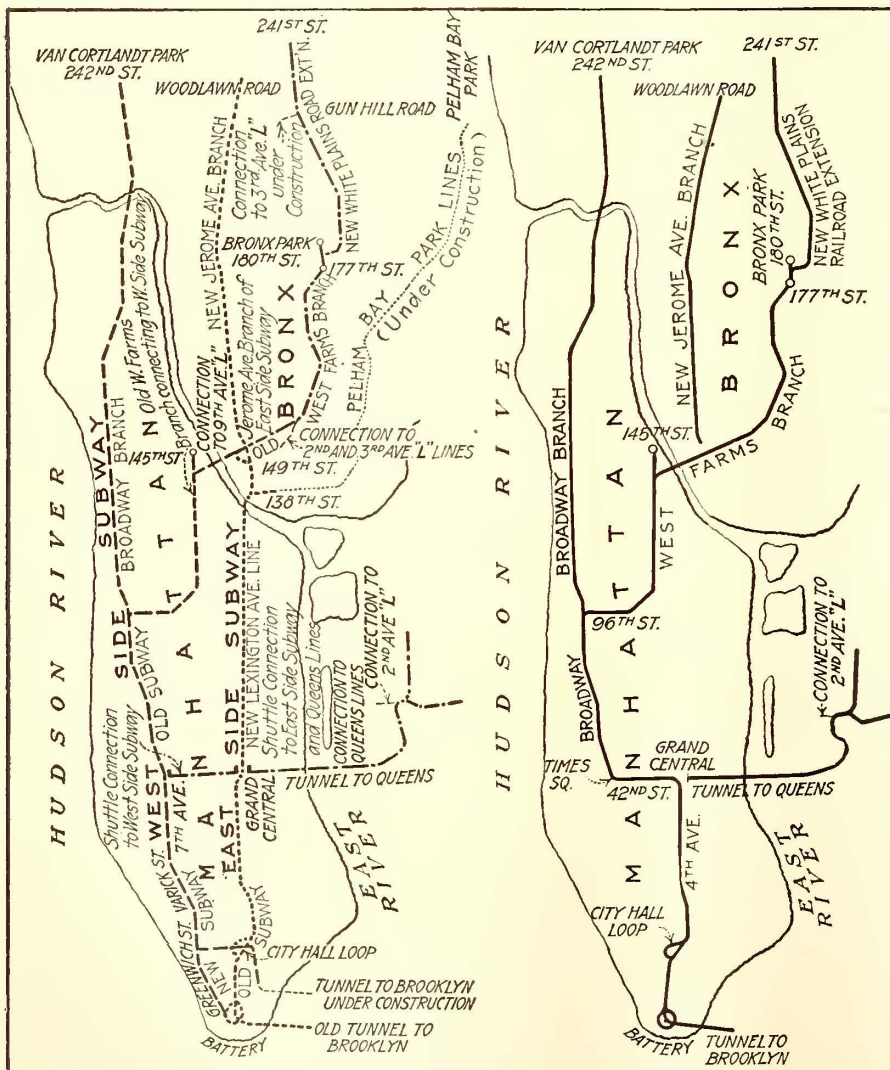
At a hearing before the Public Service Commission on Aug. 15, Frank Hedley, vice-president and general manager Interborough Rapid Transit Company, said that the difficulties experienced in the operation of the new system were due to the newness of the mechanism, especially the intricate signaling apparatus, to lack of proper terminal facilities and to shortage of men. He stated that more than 500 men are still needed to handle the system properly in spite of the addition of 500 women to the company's payroll.

The accompanying outline maps of the Interborough subway system show the several component parts and the relations of these to each other. At the left is the entire system as completed to date, with further connections now under construction represented by light lines. On the right is the system before the Seventh Avenue and the Lexington Avenue lines were opened. The west side lines in the left-hand map are indicated by dash lines, the east side lines by dotted lines. Those portions of the system which are common to both east and west side are indicated by dot-and-dash lines.

From the left-hand map it is evident that, so far as Manhattan island itself is concerned, it should be possible for a large proportion of the patrons of the road employed in the southern section of the island and living in the northern section, either east side or west side, to be carried between their homes and places of business by a direct line.

There will be no direct service to the Borough of Queens on Long Island from either east side or west side lines, but passengers who desire to go to Queens can do so by using the present tunnel from Grand Central Terminal under the East River. Unfortunately, the tunnel connecting the west side line or Seventh Avenue line with Brooklyn is not yet completed, and for the present it will be necessary for west side passengers who desire to go to Brooklyn to use the shuttle or walk a short distance down town.

The whole system of rapid transit in New York is rapidly approaching completion, but its progress has been hampered by war conditions. The policy of the Public Service Commission and the operating company has been to put each section into service as soon as available. The difficulty with the Forty-second Street shuttle service was, however, much greater than anticipated, but when the transfer stations have been permanently improved and the traffic diverted to its normal channels the "H" plan should work out smoothly.



New System Old System  
PRESENT AND FORMER INTERBOROUGH SUBWAY SYSTEMS IN NEW YORK CITY



## President Mitten's Talk

### Head of Philadelphia Rapid Transit Company States Frankly How the Company Is Meeting War Problems

In announcing in *The Trainman* for Aug. 6 the increase in wages of the employees of the Philadelphia (Pa.) Rapid Transit Company to which reference was made in the *ELECTRIC RAILWAY JOURNAL* for Aug. 10, page 251, the company printed the talk made by T. E. Mitten, president, to members of the co-operative committee, division superintendents and heads of departments at a special meeting called on Aug. 4 to consider war service conditions. Mr. Mitten said that the company was carrying 250,000 passengers more a day than last year. He said in part:

#### ONE HUNDRED CARS BOUGHT

"We have bought 100 cars for Hog Island and have just arranged to buy an additional thirty for the lines serving Chester, Essington and Lester; also 110 cars of similar type for League Island. This gives us a total of 240 new cars, and as their capacity is 50 per cent greater than the cars we now own, these 240 cars supply additional capacity equal to 360 of our present cars. Added to this, 100 open cars now being rebuilt at our shops and equipped with new trucks gives us an added capacity equal to 460 of our present cars, thus adding more than 20 per cent to the capacity of our equipment.

"Our shops are turning out fifty near-side cars per week, completely overhauled and repainted. We have contracted with the J. G. Brill Company to overhaul fifteen of the present pay-within cars per week, rewiring, repiping and repainting, and putting in manually operated doors.

"Mr. Senter (superintendent of rolling stock of the company) estimates that this, when done, will increase the efficiency of our present equipment at least 5 per cent, so that the total increased capacity of our equipment will be at least 25 per cent over that which we now have; this will give us sufficient capacity properly to care for the war workers in other plants throughout the city.

#### \$2,000,000 FOR TRACK AND CARS

"The cost of this work on track and cars now owned will run over \$2,000,000. The cost of the 240 new cars, over \$13,000 each, double the pre-war cost, will with the new power and other things incident to their operation require over \$4,000,000 additional. We are arranging to borrow \$4,000,000 from the government, and the \$2,000,000 required to put our track and equipment in shape we have saved up in our renewal fund during the past few years of this management.

"Since the adoption of the co-operative plan by the Stotesbury management in 1911, the maximum wage has been increased from 23 cents to 43

cents an hour and accidents reduced almost 50 per cent. Since the shake-up occasioned by the draft almost 40 per cent of our force are of new and younger element who are in need of greater experience.

"As to those who may be subject to draft, but too old or otherwise unfit for service in the trenches, we shall, because we are such an essential industry, make urgent representations to the government requesting that such men be permitted to remain with us and 'do their bit' by helping to carry government workers to and from their places of employment.

"Conditions in Philadelphia have been misrepresented to the War Labor Board, who, however, seemingly have not felt that there was any reason for their taking jurisdiction. It is, however, a reflection upon us that there should be any question of our ability and willingness to handle the affairs of this company without troubling the War Labor Board, and what I now propose is a move toward relieving their minds of any doubt as to conditions here.

"We signify our willingness to re-employ any or all of the men who, after voluntarily leaving the service, did not report for duty on May 29 last, as required by the company, and that we will permit them to remain in the service without prejudice and during good behavior at the same rate of pay as they would have received had they continued uninterruptedly with the company.

"Now as to the button question, we all remember the condition of things in 1911 when some of us were wearing the Keystone button, the Amalgamated button and the button of the Prattites. Fights on duty were an ordinary occurrence. Accidents by collision of cars increased in number; in fact, the

men were so busy trying to convert each other that they had little time left to devote to the performance of their duty.

"We still have the Keystone, the Amalgamated and the Prattites, and, therefore, cannot consider going back to the old condition of 'bedlam let loose' by allowing organization buttons to be worn while on duty—so we will have none of that.

"The meat of the button question elsewhere is that it denotes the willingness of the company to permit men to belong to the union. Well, we do that in an unqualified way without there being any need of recourse to the button to prove it, and in order to reassure the War Labor Board in this regard I suggest that we now reaffirm the principles of the co-operative plan, as adopted by the Stotesbury management in 1911, namely, that employees of the company may join and belong to any union or other organization without interference of any kind, but in order that the service to the public and to the war workers be safe and satisfactory, the rules of the company must be obeyed."

### New Labor Policy for Washington

The Washington Railway & Electric Company, Washington, D. C., has announced to all of its employees that it accepts the principles adopted by the War Labor Board to govern relations between workers and employers for the duration of the war.

To the extent that any of the existing rules and regulations of the company are contrary to the letter or spirit of the announced policy of the National War Labor Board, they are, to that extent, modified for the duration of the war and until further notice.

This action does not in any way affect any of the contracts now existing between the company and any of its employees. All such contracts will be fully performed and lived up to by the company.

One of the principles adopted by the War Labor Board being that employers shall in no way interfere with the right of employees to organize in trade unions, the company voluntarily accepts that principle and will in no way interfere with its employees joining or belonging to any labor union they desire.

Another of the principles adopted by the War Labor Board being that employees in the exercise of their right to organize shall not use coercive measures of any kind to induce persons to join their organization nor to induce employers to bargain or deal therewith, the company announces that the employees will, therefore, be equally protected under the principle of the open shop from any interference with their right to remain out of labor unions if they prefer to do so.

This important change in policy on the part of the company was announced by W. F. Ham, vice-president.

### Electric Railway Executives of the Country to Meet in New York on Aug. 22

The executive committee of the American Electric Railway Association has issued a call for a meeting of executives of electric railways of the country to consider recent decisions of the Federal War Labor Board. The conference will be held at the United Engineering Societies' Building, 29 West Thirty-ninth Street, New York City, at 10 a.m. on Thursday, Aug. 22.



## Franchise Changes Proposed

### Cincinnati Sub-Committee Report Approved by Joint Committee —Review of New Terms

The report of the sub-committee on revision of the street railway franchise at Cincinnati, Ohio, was approved by the joint council and citizens' advisory committee on Aug. 9. A complete draft of the proposed revised franchise to the Cincinnati Traction Company was embodied in the report. The rate of fare recommended will doubtless meet with opposition, but in all probability the revision will finally win, as the people of Cincinnati need improved service and an opportunity for interurban service into the city. The main provisions of the revised draft are as follows:

#### SERVICE-AT-COST PLAN PROPOSED

Six-cent fare, with provisions for increasing or reducing the rate, based on the cost-of-service plan.

Universal transfers.

Complete control of service and operation by the city.

Millcreek Valley line included as part of the city service.

City to have right to reroute cars at any time.

Reserve fund of \$400,000 to be created by the company.

Council to have power to order extensions and establish new and additional routes.

Freight and express service may be authorized.

Return to the company on its investment.

Entrance of interurban cars over the company's tracks.

Franchise tax of \$350,000 annually to be paid to the city, an increase of \$25,000 over the present tax.

All leases, franchises, contracts, issues of securities or transfers of franchises to be submitted to the city for approval.

Bond for faithful performance of contract requirements to be furnished by the company.

Police officials and firemen to ride free.

Arrangements for rental for use of viaducts.

Amortization of the reducible debt of \$4,000,000.

Expense of valuation and traffic survey to be repaid to the city.

Rental to be paid to the Cincinnati Street Railway, operated under lease.

Right of the city to purchase the property either by condemnation or at a valuation agreed upon.

All routes fixed in the ordinance to be retained.

#### RESERVE BAROMETER

The reserve fund of \$400,000 to start with will be used as a barometer to control the rate of fare. Its operation will be about the same as that of the interest fund under the Tayler plan at Cleveland. When the amount of the fund, through surplus earnings, reaches \$650,000, an automatic reduction of one-half a cent in the rate of fare will take

place. On the other hand, if the reserve fund should be reduced to \$150,000, through the necessity of having to draw from it for the payment of expenses, the rate will automatically increase one-half cent.

When the rate of fare is reduced to 5 cents, through accumulations of surplus, the company may retain 45 per cent of the surplus, the remaining 55 per cent going to the reserve fund. Then, when the rate is increased to 5½ cents, the company's share of surplus will be reduced to 30 per cent and when 6 cents is reached, the company may retain only 20 per cent of the surplus. When the rate of fare exceeds 6 cents, then the entire surplus is to go to the reserve.

In discussing the matter, the committee said that conditions brought about by the war made a higher rate of fare necessary. Efforts were made by various organizations to keep the maximum rate at 5 cents, as it has been, but data secured by the sub-committee showed that the cost of carrying passengers at this time is 5.746 cents per revenue passenger.

The committee commented on the intercorporate relations of the companies and it would seem likely that they will be simplified so that the city may deal more directly with the parties interested.

#### COMPANY OBJECTS TO FINANCIAL CONTROL

Walter A. Draper, vice-president, said that the company objected to several of the provisions of the tentative draft, but was willing to bring those objections before the sub-committee, in order that time may be saved in final action. One of these was the clause which gives the city unlimited control over its financial affairs. Another was the increase in the amount of percentage tax, and a third was the retention of the purchase price of \$26,238,950 which was included in the former ordinance. The company also objected to the division of the surplus as stipulated and the inclusion of the Millcreek Valley road as a part of the city line.

After the first reading of this draft in Council, public hearings are to be held, so that the people may become acquainted with its provisions.

In approving the tentative franchise revision, before the sub-committee had reported to the main joint committee, Mayor Galvin said:

"I was very reluctant to sanction any increase in the rate of fare, but an investigation of conditions, together with the statement of the War Labor Board recommending fare increases where necessary to provide increased wages and to maintain adequate service, convinced me of the necessity for it.

"The proposed ordinance is a model instrument, and the sub-committee is

entitled to praise for the fair and equitable manner in which it has disposed of all questions arising in the negotiations between the city and the railway company. Probably in no other franchise ordinance in the country are the interests of a municipality and its car riders safeguarded so carefully.

"However, before it is finally passed, I shall insist upon a clause providing that no village nor municipality adjoining Cincinnati shall have a rate of fare into Cincinnati lower than that enjoyed by Cincinnati residents."

The committee also recommended that the rate of fare on the Cincinnati, Newport & Covington Railway, or Green Line, be made 6 cents. Employees had petitioned the city to grant this rate.

The proposed new rates for both roads are meant to include a sufficient amount to allow the employees a substantial increase in wages.

### Chicago Ordinance Passed

At midnight on Aug. 15 the Chicago traction ordinance was passed without important change by the City Council, to which it was referred on Aug. 5. Several minor changes, however, were made by the committee on local transportation before the measure was finally recommended for passage.

The most important change made in the ordinance was in the provision that all transfers be issued without extra charge. All previous discussion of the franchise had contemplated a charge of 2 cents for a transfer between rapid transit and surface lines. The Aldermen contended that the people would refuse to indorse the measure on this account although they now pay 10 cents for riding on both levels. The traction officials consented to the change because there is a safeguard in the provision that rates for fares and transfers may be altered to meet the cost of service, including a guaranteed return on the investment.

The pending ordinance was indorsed by representatives of the trainmen's union. The principal objections were from Aldermen who did not want the companies to have the right of nominating members for the first board of trustees. The high standing of the men who have been suggested has, however, silenced any real criticism.

### Seattle Inquiry Nearing Completion

Thomas F. Murphine, superintendent of public utilities of Seattle, Wash., has practically completed the work of checking over the books of the Puget Sound Traction, Light & Power Company to determine the amount of revenue it will be necessary for the company to secure in order to meet the advance in wages which has been agreed upon, and to give the city the service demanded.



## No Direct Federal Relief

Announcement has been made at the White House in Washington that President Wilson does not believe that the federal government has any authority under existing laws to take over or operate electric railways and lighting companies. This became public in connection with the local railway situation at New Orleans, in which the President was asked to interfere because of labor troubles. The Washington correspondent of the **ELECTRIC RAILWAY JOURNAL** reports that the announcement confirms statements frequently made in private during the last six months by W. G. McAdoo, director general of railroads. Acting for the President, Joseph P. Tumulty, secretary to the President, sent a telegram to Martin Behrmann, Mayor of New Orleans, expressing the attitude of the federal government. The telegram was as follows:

"The President asks me to acknowledge your important telegram of yesterday and to express his opinion that as the existing law is interpreted the federal government has no power to take over electric railways and lighting companies.

"The conditions under which such companies operate in different parts of the country vary by so wide a margin that no common rule, it would appear, or method of relief could be applied to them, and it is the President's judgment that it is imperatively necessary that local and state authorities should take the action necessary for immediate relief."

## Two Extraordinary Steps

John Wanamaker has announced for both his New York and Philadelphia stores a six and one-half hour day of business, from 10 a. m. until 4:30 p. m. for two principal reasons:

1. The conservation of coal, a serious matter of importance.

2. To relieve the overcrowded street cars, trains and subways of a considerable part of their early and late rush-hour burdens, thus leaving this means of transportation free for the use of the greatly increasing army of war workers, who must in such a time necessarily get to and from their workshops without delay.

In making the announcement Mr. Wanamaker said:

"1. Whereas, in the exigencies of these critical hours, while our young men and women, relatives and employees are laying down their lives, the business men not yet called to field service are specially invoked to find a way to do something more than sell and buy Liberty Bonds and contribute to the humane and religious organizations.

"2. We business men should not wait for the officers of the government to enforce days or hours of economy. We should lead them and sustain them and do even more than we are asked."

James A. Hearn & Son, retail dry goods merchants of New York, have announced a business day from 10 a. m. to 6 p. m., for similar reasons.

## News Notes

**Reading Again Increases Wages.**—The Reading Transit & Light Company, Reading, Pa., on Aug. 6 announced an increase in the wages of its motormen and conductors from 34 to 38 cents an hour, to be effective at once, and to 40 cents on Sept. 1.

**Employees of Ohio Road Strike.**—On Aug. 2 the employees of the local line of the Columbus, Delaware & Marion Electric Company at Marion, Ohio, went on strike for an increase of wages to 42 cents an hour. They had been receiving from 27 cents to 33 cents. The men refused an offer of 35 cents an hour.

**Third Arbitrator Named.**—Governor A. O. Stanley has named Clarence U. McElroy, Bowling Green, Ky., as the third man to compose the board to arbitrate the differences between the Kentucky Traction & Terminal Company, Lexington, Ky., and the local branch of the Amalgamated Association. The company and the men each named an arbitrator and asked the Governor to name the third.

**Jersey Accepts Wage Award.**—The Public Service Railway, Newark, N. J., on Aug. 9 announced through printed cards posted in the carhouses throughout the system that it had accepted the wage plan and schedule of the War Labor Board which call for 41 to 45 cents an hour. The back pay to which the men are entitled under the decision, dating June 7, will be computed and paid before Sept. 1, the date specified in the decision.

**Hog Island Line Opened.**—The extension of its lines into Hog Island has been completed by the Philadelphia Rapid Transit Company and service with two-car trains was begun on Aug. 5. On Aug. 3 the company operated the first unit of the Eastwick Avenue substation and on Aug. 5 the entire Hog Island line, providing for the greatly increased traffic caused by the launching of the first ship from this yard, was thrown open to the public. A review of some of the other war work of the company is contained in the statement reproduced on page 301 of this issue.

**Interurban Men Get Increase.**—The Ohio Electric Railway, Springfield, Ohio, has increased the wages of its interurban conductors and motormen, effective from Aug. 1. The rates of increase are: first year, from 30 cents an hour to 35 cents; second, from 31 cents to 36 cents; third, from 32 cents to 37 cents; fourth, from 33 cents to 38 cents; fifth year, from 34 cents to 39 cents; sixth year and after, 40 cents. This increase follows one on Feb. 15, which amounted to 4 cents an hour.

There are no changes at present in the wages paid motormen and conductors on city lines. These men received an advance in wages of 3 cents an hour on June 1.

**P. R. T. Gets \$1,750,000 for Cars.**—A contract between the Philadelphia (Pa.) Rapid Transit Company and the Bureau of Industrial Housing and Transportation, Otto M. Eidlitz, chairman, was signed on the morning of Aug. 16, under the terms of which the Philadelphia Rapid Transit Company is supplied with approximately \$1,750,000 with which to purchase ninety new cars and accessories. All of the new cars are to be used for the betterment of transportation of war workers. Sixty of the cars will be used for League Island and thirty for the Chester Short Line, serving the Westinghouse plant at Lester and the Baldwin, Remington and other plants at Eddystone, also the yard of the Sun Shipbuilding Company at Chester.

**Men Have Right to Appeal.**—Paul Shoup, president of the Pacific Electric Railway, Los Angeles, Cal., has announced a radical departure in connection with the dismissal of employees from the company's service, the new plan involving the departments that choose to adopt it, but not including the clerical staff or heads of departments. The outstanding features of the new plan are, first, that every employee who is discharged has the right of appeal and the assistance of a fellow employee in investigating the facts relating to his discharge; second, that he may go all the way up the line to the president if he so chooses; and third, if then not satisfied with the justice of the decision reached, he may refer it to an impartial tribunal not named by the company and having no responsibility except to do justice.

**Wage Increase in Minneapolis.**—The Twin City Lines, Minneapolis, Minn., has increased the wages of trainmen 3 cents an hour and added 50 cents a day to the minimum guarantee for men reporting on call. About 2500 men are affected. Previous wage increases were made on Oct. 1 and June 1. The advance now made dates back to Aug. 1. The scale is as follows: first year, 35 cents; second year, 36 cents; third year, 37 cents; fourth year, 38 cents; fifth year, 39 cents; sixth year, 40 cents, with \$3 a day for extra men. The company's statement follows: "The whole subject of increased wages was discussed, and the inability of the company to pay increased wages without an increase in the rate of fare was thoroughly considered, after which the committee agreed with the management to accept an increase of 2 cents an hour for trainmen, with an additional 50 cents a day added to the present minimum guarantee for extra men reporting on call. The new scale is to be effective as of Aug. 1 and to continue pending investigation and arbitration of the question of wages and rates of fare by the Federal War Labor Board."



# Financial and Corporate

## Tennessee Net Drops 14 per Cent

### Increased Operating Costs Hit Nashville—Chattanooga Railway & Light Company Suffers from Strike

The gross earnings of the Tennessee Railway, Light & Power Company in 1917 totaled \$5,258,659, an increase of 7.7 per cent, but the operating expenses, rentals and taxes rose 24 per cent. As a result the net earnings at \$1,798,923 showed a loss of 14.1 per

The unsatisfactory showing of the Chattanooga company—a 36.1 per cent decrease in net earnings and 354.8 per cent decrease in net income—was due to the September-January strike of trainmen. Without the strike the year's record would have been satisfactory on account of the business to and from Fort Oglethorpe. Normal conditions have been restored, however, and the earnings are displaying increases.

The rapid and extensive expansion of the government's requirements at Fort Oglethorpe made it necessary to

#### COMPARATIVE INCOME STATEMENT OF SUBSIDIARIES OF THE TENNESSEE RAILWAY, LIGHT & POWER COMPANY FOR THE CALENDAR YEARS 1916 AND 1917

	NASHVILLE RAILWAY & LIGHT COMPANY			
	1917	1916	Increase	Per Cent
Gross earnings.....	\$2,458,321	\$2,383,041	\$75,280	3.2
Operating expenses.....	1,350,361	1,245,937	104,424	8.4
Net earnings.....	\$1,107,960	\$1,137,104	\$29,144	*2.6
Taxes.....	239,057	207,251	31,806	15.3
Gross income.....	\$868,903	\$929,853	*\$60,950	*6.6
Interest.....	490,071	508,971	*18,900	*3.7
Net income.....	\$378,832	\$420,882	*\$42,050	*10.0
Preferred stock dividends.....	125,000	125,000	.....	.....
Balance available for renewals, depreciation and financial requirements.....	\$253,832	\$295,882	*\$42,050	*14.2
CHATTANOOGA RAILWAY & LIGHT COMPANY				
Gross earnings.....	\$1,356,342	\$1,235,623	\$120,719	9.8
Operating expenses.....	1,039,537	739,816	299,721	40.5
Net earnings.....	\$316,805	\$495,807	*\$179,002	*36.1
Taxes.....	99,366	83,628	15,738	18.8
Gross income.....	\$217,439	\$412,179	*\$194,740	*47.2
Interest.....	359,785	356,324	3,461	1.0
Net income.....	*\$142,346	\$55,855	*\$198,201	*354.8

\*Decrease or deficit.

cent, and the surplus for the year at \$180,637 a loss of 72 per cent.

During 1917 the electric railway gross earnings amounted to \$2,263,457 or 43 per cent of the total, as compared to \$2,260,482 or 46 per cent in 1916. It is said to be probable that the volume of electric railway business will be substantially increased by the service in connection with the government activities at Chickamauga Park near Chattanooga and by the construction and operation of the large government powder plant near Nashville.

The accompanying statements show the progress made during the last year by the two railway subsidiaries, the Nashville Railway & Light Company and the Chattanooga Railway & Light Company. While the gross earnings of the former company showed an increase of 3.2 per cent, this was more than offset by the unavoidable increases in operating expenses and taxes. As a result the net income fell off 10 per cent. Nashville has realized very little, if any, profit from war prosperity, but it has been affected by the universal increase in cost of labor and materials and by the great advance in taxation prevalent throughout Tennessee.

complete the construction of the new high-speed electric line to Chickamauga Park, which was done during the summer of 1917 at a cost of \$102,104. This was the only large piece of construction work done during the year in Chattanooga, other construction expenditures being limited to the usual unavoidable requirements.

## Texas Properties Consolidated

Consolidation of the properties of the Beaumont Electric Light & Power Company, Beaumont Traction Company and Jefferson County Traction Company, in Beaumont, Tex., and of the Port Arthur Light & Power Company, Port Arthur, Tex., went into effect on Aug. 1. Under the new arrangement, the companies will be operated as the Eastern Texas Electric Company, under the management of A. F. Townsend, who has had charge of the Stone & Webster interests in the two cities for the last two years.

The consolidation was authorized about a year ago by a referendum vote of the taxpayers of Port Arthur and Beaumont, but the arrangements were not completed until a few days ago.

Its object, as announced at the time of the authorization, is to simplify the management and financing of the properties, including their more economical operation and effective administration. There was practically no opposition.

## Bankers Consider Financing Plans

### Various Methods Proposed to Overcome Restriction on Lending Capacity of War Finance Corporation

Since bankers must drop the plan to organize a \$100,000,000 corporation to help public utilities, because of the ruling of Attorney-General Gregory that Section 10 of the law limiting loans to any one borrower to 10 per cent of the War Finance Corporation capital would apply to such an intermediary company, they are considering new plans for aid. The above-mentioned ruling was referred to in the issue of Aug. 10, page 254.

The capital of the War Finance Corporation is \$500,000,000, and the 10 per cent limitation would restrict loans made to any one borrower to \$50,000,000. To get around this restriction, one plan is to form a separate intermediary corporation in each city where there is a large public utility interest. If six such companies would be formed, each could borrow to the extent of \$50,000,000 from the War Finance Corporation, or a total of \$300,000,000.

As an alternative proposition, and somewhat along the same lines, is a plan to form a separate company for each group of public utility properties, such as those managed by E. W. Clark & Company, H. M. Bylesby & Company, H. L. Doherty & Company, Stone & Webster, etc. Holders of public utility securities are scattered, but it is believed that they could be reached through such an arrangement.

An entirely new proposition being given consideration in some circles is to form a separate intermediary company for practically each transaction where the amount is a substantial one, and where the amounts are small to lump several refinancing plans in one company.

Loans thus far publicly announced by the War Finance Corporation do not indicate exceedingly heavy demands upon that organization, and it is said that those unannounced will not increase the amount to any great extent. The total of \$41,655,000 represented in the four large loans announced is also subject to further modifications. There is small likelihood that the entire amount will be called for in the majority of instances. The loans include \$17,320,000 to the Brooklyn Rapid Transit Company and \$3,235,000 to the United Railways of St. Louis.

It is said that in probably all cases, loans are being made only after the applications have been submitted to the government organization best informed as to the particular war needs involved and has received its full approval.



## B. R. T. Net Falls \$1,083,184

### President Williams Says Railways Will Gladly Share War Burdens But Cannot Serve Without Men, Materials and Money

The report of the Brooklyn (N. Y.) Rapid Transit Company for the year ended June 30, 1918, shows net income of \$4,112,054, a decrease of \$1,083,184 compared with the previous year's figures. The gross earnings from operation amounted to \$30,506,497, an increase of slightly more than \$1,000,000, but the operating expenses totaled \$18,111,804, an increase of more than \$1,370,000. The increase in taxes and fixed charges alone amounted to \$695,189.

#### SERVICE IS IMPAIRED

After presenting detailed figures, which will be published later, T. S. Williams, president of the company, says that a serious impairment of service would, in the large cities, cripple the activities related to war, or that a radical curtailment of service might almost paralyze war preparations. Yet these results have already been partially realized or are imminent because the government at Washington, under war necessity, has directly or indirectly taken the following steps: Drafted tens of thousands of experienced electric railway men; diverted additional thousands to war industries; established competitive standards of wages which electric railways cannot meet with existing revenue; doubled the price of coal and made it difficult to get at any price; increased the price of every commodity which electric railways buy; absorbed or withheld materials essential to construction and maintenance; commandeered the supply of money; increased the rates of interest, and imposed millions of new taxes.

At the same time, Mr. Williams declares, the government at home has in most cases refused, or seems reluctant to grant, even the partial relief which it could give, namely, the right to increase fares and the suspension of expensive and onerous exactions. There can be but one result from a continuance of these opposite influences. Only the strongest companies can long furnish transportation at less than cost, and there are few of such companies. Whether the end be financial losses, far reaching in their affliction, or merely impairment of facilities and service, or both, the adverse effects will be a public injury and a government handicap in the national struggle.

#### PUBLIC IS GRAVELY CONCERNED

Continuing, Mr. Williams says:

"Electric railways and their investors will gladly bear their part of the burden of this war. Much sacrifice they must necessarily make, and of this they do not complain. Their problem is no longer one of reduced profits but of excessive losses. It has become with some a question even of preservation of corporate existence, and with all it is a question of continued ability to serve.

In any aspect of the situation grave public interest is involved. If local transportation is not an essential industry, then it must accept conditions and reconcile itself to their consequences. If it be an essential undertaking, then the systems must not merely be permitted to live but must be fully empowered to serve. They cannot serve without men, materials and money.

"The figures for 1917-1918 by no means reflect the measure of burdens to which our system will be subjected during the succeeding year. The renewal of our short-term notes for subway financing will call for \$1,154,700 of additional interest; our coal will cost at least \$1,000,000 more; our wages will increase much more than \$1,000,000; nobody now knows how much larger our taxes will be, and our other costs will correspondingly reflect the higher standards of prices and the increasing difficulties of operation.

"We need more revenue, not for dividends but for bare necessities, made abnormally severe by conditions for which we are not responsible. Nearly half our patrons are now being carried on rapid transit lines, built with public and private capital, and these as well as those carried by the surface lines are receiving their transportation for less than its cost. Certainly there is neither justice nor wisdom in such a situation."

### President McCarter Fearful for Future

In the course of a review of conditions which confront his company, President T. N. McCarter of the Public Service Railway, Newark, N. J., in a statement supplementing a renewal of the company's fare appeal to the Board of Public Utility Commissioners, said:

"If the public would only stop to consider that there is no power which absolves street railways from the effects of economic laws which govern business generally, it would realize that the Public Service Railway cannot go on absorbing steadily increasing costs without getting some increase for the commodity it sells. The company must have money enough to carry on its business. No amount of specious pleading or sophistry can alter that fact. If the company is not permitted to continue the result would be a public calamity.

"For fifteen years millions of money and untinted effort have been expended in building up the railway properties, making them a homogeneous entity. The public has benefited thereby, even to a greater degree than has the company itself. To permit the property to be disintegrated, such as would be the case were it to go into a receiver's hands, would be a step backward, from

which the State could not recover for years. The people might just as well understand that unless relief is speedily afforded a receivership is not such a remote possibility as many persons might seem to think. Other important electric railway systems are already in the hands of receivers."

### Big Oil Earnings for Cities Service

Despite the difficult conditions surrounding the operations of the subsidiaries of the Cities Service Company, New York, N. Y., during 1917, and despite the deductions which were made to provide reserves for war taxes, the most important development of the year was the large increase in income. The gross income of the Cities Service Company in 1918 totaled \$19,252,493, an increase of more than 90 per cent over 1916, with net income of \$18,892,402, a gain in excess of 96 per cent. The balance applicable to dividends on the common stock and reserves was \$15,179,770, an increase of 110 per cent. This was equivalent to \$60.73 a share on the common stock outstanding in the hands of the public.

During the year \$13,898,572 was re-invested from income in properties, making a total of \$28,393,160 so re-invested from income to Jan. 1, 1918. The property values are thus being built up out of earnings at the rate of more than \$1,000,000 a month, against which no capitalization is being issued.

The great factor in the increase in earnings was the extension of oil operations. Of the gross income of the Cities Service Company, 24.6 per cent or \$4,472,652 came from public utilities, while 75.4 per cent or \$14,509,841 was derived from oil subsidiaries.

### Pittsburgh Real Estate Appraisal

Under orders from the State Public Service Commission of Pennsylvania the receivers of the Pittsburgh (Pa.) Railways have appointed a board of real estate brokers to make a physical valuation of the company's real estate, which consists of about 800 parcels. The report is to be filed within the next sixty days. The men who comprise the board are A. J. Kelly, of the Commonwealth Real Estate Company, representing the city; Henry P. Haas, president of the Freehold Real Estate Company, representing the receivers, and J. W. Cree, representative of the Denny estate, who has been agreed upon by the city and the company as the third member.

The physical valuation of the company's entire property is being made at this time under the direction of a board of engineers consisting of F. Herbert Snow, Robert M. Feustel, George Warren Fuller, Morris Knowles and J. A. Emery in order that it may be determined what proper charge the company can make to the public for its service. The appointment of the valuation commission was noted in this paper for March 23, page 582.



## Financial News Notes

**Expects to Dismantle Road.**—The Madison Light & Railway Company, Madison, Ind., expects to discontinue the operation of its railway system within the next two or three months. The company operates 3½ miles of line.

**Seeks Receiver of Cumberland Railway.**—A committee of security holders has applied for a receiver for the Cumberland Railway, Carlisle, Pa. According to the petitioners, the company defaulted on the July bond interest. It is claimed further that the property is deteriorating and that the company is running behind \$2,000 a month on fixed charges and operating expenses.

**Municipal Railway Operates at Deficit.**—The report of New Orleans auditors on the books of the city of Monroe, La., for the last fiscal year has been submitted. According to Mayor Apgar, it shows that the municipally-owned utilities, except the local railway system, were profitable during the year. The railway lost more than \$12,000 during the year. The system consists of 10 miles of road.

**Commission Reserves Abandonment Decision.**—Decision has been reserved by the Public Service Commission for the Second District of New York, after hearing the final arguments on the petition of the Dunkirk (N. Y.) Street Railway, leased to the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., for permission to abandon parts of its line in Dunkirk. All of the previous evidence was reviewed.

**Maine Trolley Road to Be Junked.**—The Rockland, South Thomaston & St. George Railway, Rockland, Me., which has been in the hands of a receiver for several weeks, was sold on Aug. 6 to the ex-president of the company, Alfred S. Black, for \$36,200. The road connects Rockland with Crescent Beach and South Thomaston. It has not been operated since last winter. It will soon be dismantled and sold for junk.

**Tiffin Line to Be Abandoned.**—The Tiffin, Fostoria & Eastern Railway has announced that operation on the local line at Tiffin, Ohio, will be suspended, following the refusal of the city to give a three-months' trial to a cash fare of 10 cents or six tickets for 45 cents. The City Council agreed to a temporary rate of 8 cents, but would go no higher. It is said the tracks will be removed from the streets, although the city has had street car service for more than twenty years. The inter-urban line will not be affected.

**Recent Plans of General Electric Traction.**—The General Electric Traction

Company announces that it has taken over the Philadelphia & Easton Electric Railway, which connects Doylestown and Easton. The General Electric Traction Company was incorporated in 1908 under the name of the Michigan & Southwestern Railroad Securities Company and the present name was taken in 1914. It has a capital of \$500,000 common stock with par value of \$5 per share and \$2,500,000 7 per cent cumulative preferred stock with \$100 par value per share. According to a recent circular of the company holders of common stock "shall be entitled to the privilege of having issued to them an equal amount, par value of 7 per cent cumulative preferred stock, when as and if issued, without the payment of any additional consideration."

**Attleboro Votes to Take Part of Railway.**—The Municipal Council of Attleboro, Mass., voted on Aug. 6 to seize the Briggs Corner end of the Taunton & Pawtucket Street Railway by eminent domain, and arrangements will be made at once for operating the road. The Swift-McNutt Company, Boston, Mass., owners of the line, offered to sell the section in question for \$20,000, but the Council voted only \$18,000, and as no agreement could be reached, it was decided to seize the section by eminent domain. It is reported that Mayor Sweet of Attleboro has received advices from the Interstate Consolidated Street Railway that it will operate the road on a service-at-cost plan, beginning on Sept. 1. It is probable that the Briggs Corner section will be included in this arrangement.

**Pittsburgh Receivership Aftermath.**—The city of Pittsburgh will not be permitted to intervene directly as a party to the receivership proceedings against the Pittsburgh Railways. This was indicated by Judge C. P. Orr, after brief argument in the United States District Court. During the hearing it was brought out that the revenue of the company under the new 5-7-cent fare will fall more than \$500,000 a year below the original estimates and that already car riding has fallen off between 13 and 14 per cent, instead of the 10 per cent estimated. After arguments on the city's petition to intervene, the Consolidated Traction Company's petition asking that the receivers for the Pittsburgh Railways be directed to pay the July rentals or turn the Consolidated Company back to its owners was taken up.

**Compelled to Operate a Nuisance.**—J. S. Lewis, president of the Southern Traction Company, Bowling Green, Ky., charged with maintaining a nuisance, waived examining trial before County Judge Drake and was held for the Grand Jury. Mr. Lewis was arrested, charged with operating old and dilapidated cars, making it dangerous for the public to travel, permitting boys too young and inexperienced to operate cars, and allowing trolley wires to fall on and across the streets while charged with electricity. Mr. Lewis stated that

he would have to discontinue the service until the necessary repairs were made and this may be in conflict with the order of Judge Moss, issued some months ago, when he refused to permit the railway to be sold for junk and ordered it to be operated. Some of the developments in connection with this case were reviewed in the *ELECTRIC RAILWAY JOURNAL* for Aug. 10, page 256.

**Opposed to Municipal Ownership Finance Plan.**—The plan of financing the purchase of the line of the United Railway from Portland to Linnton, Ore., through the sale of public utility certificates, as suggested by City Commissioner Kellaher, is fraught with many difficulties and uncertainties and is possibly invalid, according to an opinion recently rendered by City Attorney La Roche. The opinion states that the construction of such a line could be financed by the sale of bonds of the city, but that such a bond sale would have to be authorized by a vote of the people. City Attorney La Roche recommended that the safest and best way for the city to proceed, if it desired to acquire and operate a railway to Linnton, is to submit to a vote of the people a charter amendment outlining in consistent form the procedure therefor and authorizing a bond issue by the city which shall not be a general liability against the city, but to be paid solely out of the earnings of the line, or from the sale thereof.

**South Bend Bondholders Asked to Co-operate.**—A considerable amount of the first mortgage 5 per cent thirty-year gold bonds of the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., has already been deposited with the committee of which J. F. McNamara, 60 Wall street, New York, is secretary. The committee calls attention to the misleading statement in those bonds that they are under a first mortgage. The property covered by the mortgage has prior liens affecting the same approximately \$1,727,500. The mortgage securing these bonds contemplated the payment and retirement of the underlying prior bonds aggregating this amount, but it has not been done. Default has occurred in the payment of interest upon underlying bonds. This, the committee points out, seriously jeopardizes the security of the 5 per cent bonds. The fact that a large amount of these bonds are held by holders connected with or affiliated with the company's management, and that the obligation to pay off underlying bonds, which the committee is informed are also largely held by the same interests, shows the necessity of the co-operation of the holders of these bonds who are not connected with or affiliated with the management. The management has announced that a reorganization is necessary, and the committee believes in order that the 5 per cent bonds may be properly protected in a reorganization, co-operation is absolutely essential by the non-affiliated bonds.



# Traffic and Transportation

## Buffalo Vote Prospects

Active Campaign Under Way Urging Upon Voters the Need of Additional Fare for International Railway

Organized labor as represented by the Central Labor Council, and manufacturing and mercantile interests of the city as represented in the Chamber of Commerce have rallied to the support of the International Railway, Buffalo, N. Y., in its campaign for higher fares. The referendum vote on the question of whether or not the City Council's action shall be repealed in reference to the adoption of a resolution which waives certain franchise restrictions between the company and the city and allows the Public Service Commission of the Second District to fix an equitable rate of fare, will be held on Aug. 20.

There is practically no organized movement against the company's campaign to have the voters ratify the action of the City Council. Several newspapers are opposed to higher fares and a citizens' committee has been organized, but the movement in opposition has secured very little support. The action of organized labor, the Chamber of Commerce and other civic and commercial organizations which have come out boldly for higher fares appears to have crushed all opposition at the outset of the campaign.

### REFERENDUM FEARED AT FIRST

When it was first suggested that a referendum be held on the question, Henry W. Killeen, of Penney, Killeen & Nye, of counsel for the International Railway, said that if the matter was put before the people for a vote, the 6-cent fare would be overwhelmingly defeated. Such does not now seem to be the prospect. From appearances on the surface, it is generally believed that the voters will affirm the action of the Council. The Public Service Commission will then make an investigation of the financial condition of the company and a rate of fare fixed which will be put into effect on the company's city lines.

Edward G. Connette, president of the International Railway, in a letter to members of the City Council, called attention to the fact that the gross receipts of the company inside the city in 1917 were \$8,250,000. He says that the gross receipts so far this year are below those for the corresponding period of last year, but even assuming they are the same, the actual operating expenses will be more than the company's income if the 5-cent fare is allowed to remain in force.

Small printed slips are being placed in the pay envelopes of the workers in munitions plants asking them to vote for the ratification of the Council's action. The slips point out that the additional cent will be used largely for giving the railway employees a wage increase and call upon the patriotism of workers to support the government by not allowing a strike.

## Toledo Increase Sustained

Court Refuses Permanent Injunction to City Against Five-Cent Fare and Transfer Charge

Judge J. M. Killits of the Federal District Court at Toledo, Ohio, on Aug. 2 refused the petition of the city of Toledo for a permanent injunction to prevent the Toledo Railways & Light Company from increasing its rate of fare. A temporary order to that effect had been in force for about three months. The company had made an increase in the rate of fare to 5 cents, with a charge of 1 cent for transfers, following an advance in the wages of trainmen about three months ago.

### LIVING WAGES NECESSARY

The court said that the men must have a living wage and he requested Mayor Cornell Schreiber not to interfere with the company's present unembarrassed operation. The Mayor, however, has declared that he will carry the case to the higher court on appeal.

The court cannot fix a rate of fare and it is only when the city acts unreasonably or fails to act at all that the court has any function. Then it may determine a reasonable rate of fare. If the city does not act, or until it does act, the company has a right to fix a rate of fare to which its patrons shall conform, he said.

The company, the court said, is lawfully entitled to a rate of fare which will meet its current expenses and provide an annual return of at least \$480,000 above operating expenses. He believes that the present fare of 5 cents, with 1 cent for transfers, will not yield sufficient funds for this purpose. The city did not combat this claim, he said, but argued that some lower rate of fare should be tried as an experiment.

### COMPANY NOT A TRESPASSER

The company is not a trespasser and may use the streets until the Council directs that it shall stop its cars permanently. Since the company has no franchise, the only power the city possesses is of a regulatory nature in respect to the use of the streets. Such regulations will not be lawful under the constitution of the United States unless the company is permitted to charge a rate of fare that will bring in enough revenue to pay operating expenses and 6 per cent on the actual value of the railway investment.

No attempt is made to determine whether the actual investment is represented by the amount of stocks and bonds outstanding, but it is asserted that it is fair to the patrons of the road that the net return be figured upon the actual investment, as ascertained in the usual way.

The conclusions of the court follow: "As long as wages, material and supplies are as high as now, the charge of 5 cent fares, with 1 cent for transfer, is absolutely necessary to give the company the revenue it is entitled to have; the evidence indicates that even that rate is not sufficient.

"There is nothing that can legally prevent a further raise in fares if the expenses of operation continue to increase. Fares are increasing in other cities.

"The Mayor's proposition of eleven tickets for 50 cents would not bring in revenue to pay the company's increasing operating expenses and leave anything for the investment. The city has no power under present conditions to impose and enforce such a rate. In view of the facts before the court, such a rate would be unlawful and unenforceable under the law."

The city of Toledo on Aug. 7 filed bond and took an appeal to the Circuit Court of Appeals from the decision. The court set Sept. 6 for the hearing, but granted an extension beyond that time, so that the city can prepare its case.

## Six Cents for San Jose

The Railroad Commission of California has authorized the San Jose Railroads, which operates in San Jose and suburbs, between San Jose and Santa Clara, Santa Clara County, to increase fares to 6 cents where the fare was formerly 5 cents. The one-way fare between San Jose and Alum Rock has been increased from 10 cents to 15 cents, and where the rate has been 10 cents or higher, the company is allowed to sell 125 5-cent coupons for \$5. The company showed a deficit of \$131,602 for the twelve months ending April 30 last. The commission found that the facts presented at the hearing revealed an actual emergency in the affairs of the company. Since 1913 revenues have been insufficient even to pay operating expenses and interest on bonds, to say nothing of interest due on unsecured debts or a return to stockholders.

The Railroad Commission has also authorized the Peninsular Railway, operating in San Jose and Palo Alto, and between San Jose and Los Gatos, Alum Rock Park and Congress Springs, to increase its fares from 5 to 6 cents in Palo Alto and San Jose. Round-trip tickets and monthly commutation fares have been increased about 20 per cent. The evidence clearly showed that the company's operating revenue was insufficient, and immediate relief must be granted if an adequate service was to be continued.



## Oregon Commission Had Jurisdiction

### In Portland Six-Cent Case, State Supreme Court Upholds Commission Rate Change

The authority of the Public Service Commission of Oregon to adjust the fares of the Portland Railway, Light & Power Company was upheld by the State Supreme Court on July 23 when it affirmed the lower court for Multnomah County in the case of the city of Portland against the Public Service Commission, known as the 6-cent fare case. The opinion, written by Justice Burnett, was in part as follows:

#### REVIEW OF CASE

"The city of Portland, a municipal corporation, instituted this suit against the Portland Railway, Light & Power Company, and thereby seeks to nullify an order made by the defendant, the Public Service Commission of Oregon, allowing the company to charge 6 cents for the transportation of each person over its lines in the same general direction, instead of 5 cents, as prescribed by an ordinance enacted by the Council of the plaintiff and conferring upon the company the franchise under which it operates. A general demurrer to the complaint was sustained by the circuit judges in Multnomah County, sitting *en banc*. The city appealed.

"The essence of the dispute presented in this litigation is, whether upon the application of a public service corporation like the company, the Public Service Commission of the State had the authority to change the rate of fare prescribed by the city ordinances giving the company the right to operate street railways in the city of Portland. The proper disposition of this suit depends upon the solution of that question of jurisdiction. We are not concerned with the wisdom of the commission's decision. Whether or not it acted wisely in increasing the rate of fare is not for our decision in this case on demurrer to the bill. If we find that it had jurisdiction to make the change, our quest is ended.

"Section 51 of the act creating the Public Service Commission empowers the commission, after investigation, to order the substitution of reasonable rates and charges instead of those which it shall find to be unjust and unreasonable, and, by the following section, it may afterward revise its own decision.

#### NO VIOLATION COMMITTED

"The city says the action of the commission is void because it violated the constitutional provisions forbidding any state to impair the obligation of a contract, and that it deprived the city of Portland and its inhabitants of their property and rights without due process of law. This presents the principal question for consideration. It is urged that the ordinance under which the railway and its predecessors in interest have acted were offers to them which they were required to, and did, accept

before proceeding to operate their plant, and that this constituted a contract between the city of Portland and the company which cannot be violated by any subsequent legislation.

"In support of its contention in this respect, the city cites *Cleveland vs. Cleveland Railway*, 194 U. S. 597; *Detroit vs. Citizens' Street Railway*, 184 U. S. 368, and *Detroit United Railway vs. Michigan*, 242 U. S. 238. In all those cases the State had expressly and literally authorized the municipality in so many words to adjust the matter by contract.

"The Portland charter under consideration says nothing about a contract, but speaks of a grant and requires legislative action. True it is that the franchise does not become operative until the grantee has accepted. The term 'grant' implies offer of the city and acceptance by the company, for the municipality cannot fashion a grant and compel anyone to accept it. The distinction is too finely drawn whereby government control of rates according to reasonableness is applicable to the so-called 'grant' cases and withheld from those which may be called 'contract' cases. But all of such conventions, whether of pure contract or by public grant, are made subject to the ever-present principles that the charges shall be fair and reasonable and that the right to adjust them is primarily the prerogative of the State.

"Finally, the complaint urges that the order of the commission is void because the public utilities act is not retroactive. This contention may be dismissed with the statement that the law does and is designed to deal with conditions as they arise and to adjust matters relative to concerns serving the public from time to time as may be required. The Circuit Court was right in dismissing the bill and its decision is affirmed."

The argument before the six judges of Multnomah County in this case was reviewed in the *ELECTRIC RAILWAY JOURNAL* for March 16, page 543, while the decision of that court in the case was abstracted in this paper for March 30, page 617.

### Interurbans Have Fare Rights

The Public Service Commission of Pennsylvania in an opinion dated July 31 ruled that an interurban electric railway may increase its fares beyond the 5-cent limit specified in a franchise ordinance when it is necessary to do so to provide enough revenue for operation and maintenance and to permit a fair return to investors.

The decision was given in dismissing complaints made against the Buffalo & Lake Erie Traction Company, which has a line in Erie County. The ruling, which has a State-wide application, was given on the complaints made by North

East Borough, Harbor Creek and North East Townships, Erie County, and as a part of the proceeding a physical valuation of the company's properties in Pennsylvania was made by the commission's engineers.

It is similar to a ruling in another case that the commission could take jurisdiction in a complaint that a fare specified in a franchise ordinance had been exceeded and it is possible an appeal will be taken to the Superior Court.

The commission decided the case after an exhaustive study of values and declares that rates on other lines radiating out of Erie are higher; that not enough has been set aside out of earnings for depreciation and that there was no evidence offered that the increase was discriminatory.

John S. Rilling, a member of the commission, adds to the decision a concurring opinion in which he says in part:

"The municipal consent provided by the constitutional provision is merely the acquiescence by the municipality to the doing of that which the company through its charter has a legal right to do. The consent does not add one iota of additional power to the company to construct its lines. \* \* \* Municipalities in Pennsylvania do not now have nor have they ever had the power or authority to regulate the rate of a public utility."

He continues to the effect that the Public Service Commission "is armed with the unabridged police power of the State" and that "no rate regulations passed by municipalities in franchise ordinances, whether prior to or after the enactment of the public service law, can interfere with the proper exercise by the commission of the rate-regulating authority delegated to it by that law."

### Six Cents for East St. Louis

Officials of the East St. Louis (Ill.) Railway were notified on Aug. 9 by the Illinois Public Utilities Commission that a 6-cent fare had been granted as an emergency relief, and that a second hearing of the company's petition asking a 7-cent cash fare will be held later.

The Alton, Granite City & St. Louis Traction Company, a subsidiary of the East St. Louis & Suburban Railway, which also controls the East St. Louis Railway, on Aug. 9 began collecting a 7-cent fare on city lines in Alton and on a connecting line between Venice and Brooklyn.

L. C. Haynes, president of the company, said that the company hoped to get a 7-cent fare in East St. Louis at the next hearing. The 6-cent fare will add approximately \$150,000 to the yearly income of the East St. Louis company, officials estimated.

The Alton, Granite City & St. Louis Traction Company was also recently granted authority by the commission to collect a 3-cent-a-mile cash fare and 2-cent ticket fare on its interurban lines. The new rates went into effect several weeks ago.



# Higher Fares Granted in 238 Cities

Nearly 10,000,000 Out of 41,000,000 of Urban Population in the United States Are Now Paying More Than Five Cents

Supplementing the list of fare increases printed in last week's issue of the ELECTRIC RAILWAY JOURNAL the Information Bureau of the American Electric Railway Association has analyzed the data on fare increases and arranged them for convenient reference in the accompanying tabular forms.

Out of a total urban population in the United States of 41,000,000, about 9,950,000, or more than 24 per cent, are paying fares higher than 5 cents.

The number of cities involved in the higher rates of fare is 238, and they are located in thirty-two of the forty-eight states of the Union and four of the eleven provinces of Canada.

The method of increase ranges from a raise to a straight 10-cent fare to the abolition of workmen's reduced rates. A summary of methods used follows:

Ten-cent fare ..... 3 cities.  
 Eight-cent fare ..... 1 city.  
 Ten-cent owl service; 7-cent regular ..... 1 city.

Ten-cent owl service; 6-cent regular ..... 1 city.  
 Ten-cent owl service; 5-cent regular ..... 5 cities.  
 Seven-cent fare ..... 39 cities.  
 Six-cent central zone with additional charge for ride outside... 16 cities.  
 Six-cent fare ..... 83 cities.  
 Five-cent central zone with additional charge for ride outside... 11 cities.  
 Five-cent fare; 1-cent charge for transfer ..... 17 cities.  
 Reduced rates eliminated..... 42 cities.  
 Four-cent fare; 1-cent charge for transfer..... 1 city.  
 Workmen's reduced rates abolished ..... 18 cities.

## FARE INCREASES IN THE UNITED STATES AND CANADA

### Cities in Which a 10-Cent Fare Is Being Charged

Name	Population
Tacoma, Wash. (on municipal lines) .....	112,770
Manistee, Mich. ....	12,381
Spencer, Mass. ....	6,740

### Cities in Which an 8-Cent Fare Is Being Charged

Name	Population
Reading, Pa. (suburban lines) .....	109,381

### Cities in Which an 8-Cent Fare Is Being Charged for Owl Service and a 6-Cent Fare at Other Times

Name	Population
Edmonton, Canada (municipal lines) .....	70,000

### Cities in Which a 10-Cent Fare Is Being Charged for Owl Service and a 6-Cent Fare at Other Times

Name	Population
Montreal, Canada .....	600,000

### Cities in Which a 10-Cent Fare Is Being Charged for Owl Service and a 5-Cent Fare at Other Times

Name	Population
Ottawa, Canada .....	110,000
Des Moines, Iowa .....	86,368
Little Rock, Ark. ....	61,627
Lincoln, Neb. ....	52,500
Fort William, Canada (municipal lines) ...	16,499

### Cities in Which a 7-Cent Fare Is Being Charged

Name	Population
Boston, Mass. ....	756,476
Cambridge, Mass. ....	112,981
Tacoma, Wash. (by privately-owned company) .....	112,770
Somerville, Mass. ....	87,039
Manchester, N. H. ....	78,283
Malden, Mass. ....	51,155
Chelsea, Mass. ....	46,192
Newton, Mass. ....	43,715
Everett, Mass. ....	39,233
Joliet, Ill. ....	38,010
Brookline, Mass. ....	32,730
Waltham, Mass. ....	30,570
Wilmington, N. C. ....	29,892
Shenandoah, Pa. ....	29,201
Lewiston, Me. ....	27,809
Medford, Mass. ....	26,234
Meridian, Miss. ....	23,285
Ocean City, N. J. ....	20,000
Bartlesville, Okla. ....	20,000
Mahanoy City, Pa. ....	17,463
Ogdensburgh, N. Y. ....	16,718
Woburn, Mass. ....	15,969
Augusta, Me. ....	14,170
Watertown, Mass. ....	14,867
S. Framingham, Mass. ....	13,982
Arlington, Mass. ....	12,811
Waterville, Me. ....	12,702
Winthrop, Mass. ....	12,692
Chambersburg, Pa. ....	11,800
Carlisle, Pa. ....	10,726
Keene, N. H. ....	10,633
Natick, Mass. ....	10,102

Name	Population
Middleborough, Mass. ....	9,048
Lexington, Mass. ....	4,918
Canton, Mass. ....	4,797
Girardville, Pa. ....	4,396
Mauch Chunk, Pa. ....	3,952
Sharon, Mass. ....	2,310
Brookfield, Mass. ....	2,204

### Cities Which Have a 6-Cent Central Zone, With an Additional Charge for Rides Outside Thereof

Name	Population
Fall River, Mass. ....	128,366
Lowell, Mass. ....	113,245
Lynn, Mass. ....	102,425
Lawrence, Mass. ....	100,560
Brockton, Mass. ....	67,449
Malden, Mass. ....	51,155
Salem, Mass. ....	48,562
Haverhill, Mass. ....	48,477
Chelsea, Mass. ....	46,192
Quincy, Mass. ....	38,136
Taunton, Mass. ....	36,283
Gloucester, Mass. ....	24,395
Beverly, Mass. ....	21,645
Peabody, Mass. ....	18,360
Melrose, Mass. ....	17,445
Hyde Park, Mass. (Bay State lines) .....	16,000

### Cities in Which a 6-Cent Fare Is Being Charged

Name	Population
St. Louis, Mo. ....	757,309
Montreal, Canada .....	600,000
Kansas City, Mo. ....	297,847
Portland, Ore. ....	295,463
Vancouver, Canada .....	230,000
Pittsburgh (suburbs, West Penn Railways) .....	149,685
New Haven, Conn. ....	129,579
Bridgeport, Conn. ....	121,589
New Bedford, Mass. ....	118,158
Hartford, Conn. ....	110,000
Reading, Pa. ....	109,381
Kansas City, Kan. ....	99,437
Wilmington, Del. ....	94,265
Waterbury, Conn. ....	86,973
Wilkes-Barre, Pa. ....	76,776
Erie, Pa. ....	75,195
Atlantic City, N. J. ....	57,660
Saginaw, Mich. ....	55,642
New Britain, Conn. ....	53,794
McKeesport, Pa. ....	47,521
Chester, Pa. ....	41,396
Lexington, Ky. ....	41,097
Jackson, Mich. ....	35,363
Aurora, Ill. ....	34,204
Stamford, Conn. ....	30,884
Easton, Pa. ....	30,530
Poughkeepsie, N. Y. ....	30,390
Mt. Carmel, Pa. ....	30,268
Battle Creek, Mich. ....	29,480
Meriden, Conn. ....	29,130
Elgin, Ill. ....	28,203
Nashua, N. H. ....	27,237
Norwalk, Conn. ....	26,899
Hagerstown, Md. ....	25,679
Paducah, Ky. ....	24,842
Middletown, Conn. ....	22,799
Danbury, Conn. ....	22,556
White Plains, N. Y. ....	22,465
Pottsville, Pa. ....	22,372
Duquesne, Pa. ....	19,964
Northampton, Mass. ....	19,926
Oil City, Pa. ....	19,297
Peekskill, N. Y. ....	18,530

Name	Population
Torrington, Conn. ....	18,018
Sioux Falls, S. D. ....	16,499
Woburn, Mass. ....	15,969
Ithaca, N. Y. ....	15,848
Cairo, Ill. ....	15,794
Fairmont, W. Va. ....	15,566
Jacksonville, Ill. ....	15,481
Connellsville, Pa. ....	15,455
Chickasha, Okla. ....	15,447
Newburyport, Mass. ....	15,273
Ansonia, Conn. ....	15,152
Rutland, Vt. ....	14,831
Hornell, N. Y. ....	14,685
Milford, Mass. ....	14,110
Naugatuck, Conn. ....	14,093
Albuquerque, N. M. ....	14,025
Meadville, Pa. ....	13,802
Plymouth, Mass. ....	13,743
Geneva, N. Y. ....	13,711
Ossining, N. Y. ....	13,705
Dover, N. H. ....	13,272
Wakefield, Mass. ....	12,733
Greenfield, Mass. ....	11,998
Laurel, Miss. ....	11,779
Beacon, N. Y. ....	11,555
Latrobe, Pa. ....	11,393
Frederick, Md. ....	11,112
Danvers, Mass. ....	9,949
Rochester, N. H. ....	9,719
Derby, Conn. ....	9,655
Athol, Mass. ....	9,461
Braintree, Mass. ....	9,376
Claremont, N. H. ....	7,529
Maynard, Mass. ....	6,890
Stoughton, Mass. ....	6,316
Branford, Conn. ....	6,047
Amherst, Mass. ....	5,112
Bellows Falls, Vt. ....	4,883
Waverly, N. Y. ....	4,856
Randolph, Mass. ....	4,301

### Cities Which Have a Central 5-Cent Zone With an Additional Charge for Rides Outside Thereof

Name	Population
Pittsburgh, Pa. ....	579,090
Milwaukee, Wis. ....	436,535
Providence, R. I. ....	254,906
Springfield, Mass. ....	105,942
Holyoke, Mass. ....	62,286
Pawtucket, R. I. ....	59,411
Woonsocket, R. I. ....	44,360
Norwich, Conn. ....	29,419
Chicopee, Mass. ....	29,319
New London, Conn. ....	20,985
Westfield, Mass. ....	18,391

### Cities Which Have a 5-Cent Fare With an Additional Charge of 1 Cent for a Transfer

Name	Population
Newark, N. J. ....	408,894
Jersey City, N. J. ....	306,345
Toledo, Ohio. ....	191,554
Paterson, N. J. ....	138,443
Trenton, N. J. (Public Service Railway) .....	111,593
Camden, N. J. ....	106,233
Elizabeth, N. J. ....	86,690
Hoboken, N. J. ....	77,214
Passaic, N. J. ....	71,744
Bayonne, N. J. ....	69,893
Perth Amboy, N. J. ....	41,185
Orange, N. J. ....	33,080
Plainfield, N. J. ....	25,805
New Brunswick, N. J. ....	25,512

Name	Population
Meridan, Miss. ....	21,818
Hackensack, N. J. ....	16,945
Rahway, N. J. ....	10,219

### Cities in Which Reduced Rate Tickets Have Been Abolished and a Straight 5-Cent Fare is Charged

Name	Population
Seattle, Wash. ....	348,639
Salt Lake City, Utah. ....	117,399
Des Moines, Ia. ....	101,598
Duluth, Minn. ....	94,495
St. Joseph, Mo. ....	85,236
Evansville, Ind. ....	76,078
Altoona, Pa. ....	58,659
Roanoke, Va. ....	43,284
Decatur, Ill. ....	39,631
Joliet, Ill. ....	38,010
Quincy, Ill. ....	36,798
Everett, Wash. ....	35,486
Columbia, S. C. ....	34,611
Lynchburg, Va. ....	32,940
Danville, Ill. ....	32,261
Sheboygan, Wis. ....	28,559
Bloomington, Ill. ....	27,258
Muncie, Ind. ....	25,424
Galesburg, Ill. ....	24,276
Anderson, Ind. ....	23,996
New Albany, Ind. ....	23,629
Shamokin, Pa. ....	21,129
Fond du Lac, Wis. ....	21,113
Asheville, N. C. ....	20,823
Marion, Ind. ....	19,334
Greensboro, N. C. ....	19,577
Kingston, Canada .....	18,374
Owensboro, Ky. ....	17,784
Vincennes, Ind. ....	17,645
Muscataine, Ia. ....	17,500
Hot Springs, Ark. ....	17,238
Fort William, Canada (except children) .....	16,499

### Cities Having a 4-Cent Fare With an Additional Charge of 1 Cent for a Transfer

Name	Population
Cleveland, Ohio. ....	674,073

### Cities in Which Workmen's Reduced Rate Tickets Have Been Abolished

Name	Population
Toledo, Ohio. ....	191,554
Shamokin, Pa. ....	19,588
Biddeford, Me. ....	17,665
Gary, Ind. ....	16,802
Greensboro, N. C. ....	15,895
Greenfield, Mass. ....	11,998
Bluefield, W. Va. ....	11,188
High Point, N. C. ....	9,525
Sanford, Me. ....	9,049
Concord, N. C. ....	8,715
Claremont, N. H. ....	7,529
Salisbury, N. C. ....	7,153
Valparaiso, Ind. ....	6,987
Stoughton, Mass. ....	6,316
Perth Amboy, Mass. ....	4,301
Spencer, N. C. ....	3,000
Hadley, Mass. ....	2,000
Graham, Va. ....	2,000



## Against Fare Increase

### Pennsylvania Commission Orders Reduction From Eight Cents to Six Cents—Company Explains

The Public Service Commission of Pennsylvania has sustained a complaint of the Borough of Ashland against the action of the Schuylkill Railway in advancing fares from 6 cents to 7 cents on May 28, 1917, and has ordered the old 6-cent rate restored.

The commission has ordered a reduction of fares on the entire system. As the company has been charging an 8-cent fare since July 12 the decision of the commission will mean a 2-cent reduction in all zones.

The company first announced its intention of increasing fares from 5 cents to 6 cents in 1913. The Ashland Borough filed a protest against the increase but the commission ruled at that time that the burden of proof was on the complainant and the increase was sustained.

Later the company filed a new tariff, effective on May 28, 1917, increasing the rate of fare from 6 cents to 7 cents. Ashland Borough again filed a protest and in this case the commission decided that the burden of proof was on the railway. While a decision was still pending the company filed another tariff, effective on July 12, making a further increase in fares from 7 cents to 8 cents. Ashland Borough complained against the increase because a decision was pending in the case of the raise from 6 cents to 7 cents.

#### COMMISSION UNDER MISAPPREHENSION

The failure of the Schuylkill Railway to rescind its 8-cent fare and put into operation again the 6-cent fare as ordered by the commission in its opinion recently handed down, is explained in a statement issued by the management. Meanwhile the company has appealed for a rehearing and the operation of the order is held in abeyance. The company says in part:

"The company has filed its notice of an application for rehearing of the case, because a compliance with the commission's order to return to the 6-cent fare would result in the forced shutting down of its entire operations. The company simply could not live on a 6-cent fare.

"The reasons assigned by the commission in support of its 6-cent fare order are based upon a complete misapprehension of the facts in the case. The company will endeavor to make them clear on the rehearing. This evidence will not only show conclusively that the company cannot live on a 6-cent fare, but it will show that the revenue which it will earn even with an 8-cent fare will be insufficient to enable it to continue operation at full efficiency without practice of the most rigid economy.

"The officials of the company regret that this misapprehension of the facts on the part of the commission should have resulted in a situation where the company might seem to be unrespon-

sive to the commission's order, but they feel confident that the facts in the case justify them in the position which they have taken and that upon rehearing they will be able completely to vindicate this position before the commission and in the public mind and maintain the 8-cent fare."

## Basis of Portland Rates

### Statement Showing Conditions Under Which Recent Maine Settlement Was Reached

A reference to the recent fare agreement at Portland, Me., was made in the *ELECTRIC RAILWAY JOURNAL* of Aug. 3, 1918, page 213. The agreement terminates a rate case of long standing, and was made between Attorney-General Sturgis of Maine and W. S. Linnell, representing the Cumberland County Power & Light Company, upon the recommendation of R. M. Feustel, of Sloan, Huddle, Feustel & Freeman, consulting engineers for the Public Utilities Commission of Maine.

The system of rates recommended by the State's engineers and that submitted by the company were identical in that both contemplated the creation of a central zone with a fare of 6 cents, and outside zones, about 1 mile long, with a fare of 2 cents per zone, on the interurban lines. The two plans differed in the limits of the central zone, the State's plans permitting a longer ride than the company's. As stated in this paper, the 5-cent fare has also been retained on three lines operating entirely within the central zone and in the short-haul territory, a charge of 1 cent, however, being made for each transfer issued from the 5-cent lines. There is no charge for transfers from 6-cent cars.

Sloan, Huddle, Feustel & Freeman found that the company required \$123,000 additional revenue a year to meet the increasing costs of labor and material, and they estimated that the increased revenue yielded by their suggested schedule would be a minimum of \$110,000 a year. They reported that certain rerouting suggestions made by the company were feasible and that approximately \$20,000 a year could be saved if these were put into effect. The valuations of the State and of the company showed the value of physical property (on the Portland Railroad) to be in excess of the outstanding stocks and bonds. The cost of reproduction now as found by the State's engineers was about \$6,263,000, exclusive of promotion and the cost of securing capital. The company's figure, \$7,524,000, included these items. The Public Utilities Commission did not determine the fair value of the property, but allows the company, on twenty-four hours' notice, to put into effect the fare schedules proposed by the State's engineers. The company's valuation was prepared by George E. Haggas, assistant to the general manager of the Cumberland County Power & Light Company.

## Vancouver Fares

### British Columbia Electric Railway Increases Fares with Little or No Opposition or Trouble

Brief mention was made in the *ELECTRIC RAILWAY JOURNAL* for July 20, page 135, of the fare situation on the British Columbia Electric Railway, Vancouver, B. C. On finding it necessary to pay the full wage demands of its employees the company informed the City Councils of Vancouver, New Westminster, North Vancouver, South Vancouver, Point Grey and Burnaby that it was impossible to operate on the fares then in force. The Vancouver City Council passed a by-law authorizing higher fares. The Point Grey Council did the same. The South Vancouver commissioners some days later also authorized the company to increase fares. Subsequently the New Westminster City Council passed a resolution and will pass a by-law authorizing increased fares.

Accounts recently to hand indicate that North Vancouver is still debating the matter, while Burnaby has refused permission to the company to advance rates. On Vancouver Island the City Council of Victoria also refused permission to the company to increase fares.

#### ONLY ONE OBJECTOR

On July 16 the company was operating cars in Vancouver and New Westminster on a 6-cent fare. These systems, of course, are separate. The Victoria City system is operating on a 5-cent fare to all passengers. The North Vancouver city system was shut down at that time pending permission to charge a 6-cent fare. The fares on the Vancouver System now are: 6-cent cash fare or six tickets for 35 cents instead of 5 cents cash and six tickets for 25 cents. On those portions of the city lines extending into South Vancouver and Point Grey a 6-cent fare is charged within each of the municipalities. The fare from Vancouver City to South Vancouver and Point Grey is 7 cents, and settlers' tickets are sold ten for 70 cents. The cash fare is, of course, 12 cents, 6 cents in each district. The Burnaby municipality having refused permission to the company to charge higher rates, the railway is not operating the 2-mile strip of city line there and indications point to the possible necessity of the company forfeiting its franchise in that place.

Where city passengers are carried on interurban lines the fares within the city have, of course, been advanced to 6 cents. The fare from Vancouver to Beaconsfield on the Central Park line, formerly 5 cents, is now 7 cents.

The fares on all the interurban lines will probably be revised shortly and put on a mileage basis.

The 6-cent fare has taken very well with the public. There was practically no opposition, and little or no difficulty was encountered in handling the odd cent. There is a very large demand for strip tickets.



## Tumult and Shouting

### Detroit Railway Abandons Six-Cent Fare Following Protest That Vents Itself in Violence

Disgraceful scenes were enacted in Detroit, Mich., on Aug. 10, 11 and 12, when political candidates incited the lawless element of the population to violence, destruction and bloodshed, following the action of the Detroit United Railway in raising fares from 5 cents to 6 cents. A number of people were injured and thousands of dollars worth of damage was done to property of the railway. Cars were overturned and wrecked; car doors and windows were smashed and mob rule generally prevailed. The police appeared to be helpless.

The disorder occurred when political candidates advised the people to pay only 5 cents and the Common Council adopted an ordinance fixing the rates of fare on non-franchise lines at 5 cents for a single ride, six tickets for a quarter and workmen's tickets at eight tickets for a quarter.

At midnight Monday when the ordinance went into effect the city secured an injunction in the Wayne Circuit Court restraining the railway officials from violating the ordinance. The following morning company officials appealed to the local federal court for an injunction to restrain the city from enforcing the ordinance. This injunction was refused by Judge Tuttle. The court declared that the city should settle the railway question by giving the company a franchise or by buying and operating the lines. The company at once prepared to appeal direct to the United States Supreme Court at Washington.

In the meantime the company is accepting 5-cent fares and will in a few days sell six-for-a-quarter tickets and workmen's tickets.

Immediately following the refusal of the federal judge to interfere, F. W. Brooks, president of the company, telegraphed to W. H. Taft and Frank P. Walsh of the National War Labor Board, calling attention to the situation in Detroit. Mr. Brooks declared that the recent wage increase awarded Detroit United Railway motormen and conductors by the War Labor Board would increase the company's expenses by at least \$2,000,000 a year. He pointed out that the Common Council not only refused to permit a higher fare so that additional revenue to meet increases might be had, but enacted an ordinance reducing the fares, which the Labor Board had emphatically declared too low. Mr. Brooks said that the company was endeavoring to maintain service so that the munition factories would not be crippled, but warned that unless immediate relief were given the company would have to abandon service.

During the riots the company was forced to abandon service on four or five lines to save the employees from violence and to protect property from destruction. In dozens of cases when

passengers refused to pay more than 5 cents the car crews refused to move the cars or ran cars onto side tracks and left them there. Saturday and Sunday riots were of frequent occurrence in the downtown streets, while in the factory districts cars were overturned and wrecked.

In a statement to the public on Aug. 13 President Brooks of the company placed the responsibility for the rioting, robbery and destruction of property on the politicians, the Common Council and the newspapers.

## Transportation News Notes

**Interstate Line Wants Increase.**—The Cleveland & Erie Railway, which operates between Erie, Girard and East Springfield, Pa., and Conneaut, Ohio, on Aug. 13 asked the Interstate Commerce Commission for increases to 3 cents a mile in cash train fares, 25 per cent increase in freight rates, and an advance to 7 cents in rates in Erie, Pa.

**Withdrawal of Tickets Recommended.**—A. L. Murphine, superintendent of public utilities of Seattle, Wash., in a recent communication to the Council, recommended a straight 5-cent car fare on all municipal lines. Mr. Murphine states that the expense of handling paper tickets should be eliminated. At present twenty-five tickets are sold for \$1.

**Springfield Seeks Higher Fares.**—The Springfield (Mass.) Street Railway has filed a request with the Public Service Commission for authority to charge double fares on its city lines between midnight and 4.59 a. m. The company also seeks permission to increase the unit fare from 5 cents to 6 cents at all hours on the city lines within the central zone of rates.

**Reduces Minimum Fare.**—The Public Service Commission of Massachusetts has approved a reduction of the minimum fare on the Grafton & Upton Railroad, Milford, Mass., from 10 cents to 6 cents. The road was under federal control and was obliged to charge a minimum rate of 10 cents, but being one of the so-called short lines soon found its business falling off.

**Seven Cents Asked in Minneapolis.**—The Minneapolis (Minn.) Street Railway, controlled by the Twin City Rapid Transit Company, has filed with the City Council its application for increased fares. Horace Lowry, president of the company, stated in the application that a 7-cent fare was necessary in view of recent developments heavily increasing the cost of operation.

**New Buffalo-Lockport Tariff.**—According to a tariff schedule of the Buffalo, Lockport & Rochester Railway,

Rochester, N. Y., one-way cash fares on its line are increased from approximately 2½ cents a mile to 3 cents a mile, one-way ticket fares are increased from 2¼ cents a mile to 2½ cents a mile, and round-trip fares are increased to double the one-way fares.

**Ticket Boxes on St. Louis Cars.**—Separate boxes for tickets have been placed on all cars of the United Railways, St. Louis, Mo. Bruce Cameron, superintendent of transportation, says that the boxes have been installed to relieve the conductors of the extra duty of handling and punching the tickets, thus giving the men more time to make cash change, handle transfers and run the cars.

**Youngstown May Adopt Principles of Tayler Grant.**—A committee of the City Council of Youngstown, Ohio, spent some time during the week ending Aug. 10 in Cleveland studying the operation of the Cleveland railway and the amendment to the Taylor service-at-cost franchise granting an increased fare temporarily. It is said that the fare in Youngstown may have to go higher than 5 cents.

**Six Cents for Worcester.**—Mayor P. G. Holmes of Worcester, Mass., is said to have secured assurances from Francis H. Dewey, president of the Worcester Consolidated Street Railway, that the proposed 6-cent fare for that city is only for the period of the war. Six-cent fares already are in force on the suburban lines of the company. The 6-cent fare went into effect in Worcester on Aug. 1.

**Use of One-Man Cars Put Off.**—The use of one-man cars on the lines of the Galesburg Railway, Lighting & Power Company, Galesburg, Ill., has been postponed for the present. The company will pay the wage scale proposed by the War Labor Board, the scale to run from 38 to 41 cents an hour. Reference to the probable use of one-man cars by the company was made in the *ELECTRIC RAILWAY JOURNAL* for July 27, page 176.

**Asbury Park Road Wants Increase.**—The Atlantic Coast Electric Railway, Asbury Park, N. J., has applied to the Board of Public Utility Commissioners of New Jersey, for permission to increase its fare from 5 cents to 7 cents. This would make the fare from Asbury Park to Long Branch 21 cents instead of 15 cents and the fare to Spring Lake 15 cents instead of 10 cents. The hearing has been set by the commission for some time in September.

**Gorge Road Will Charge More.**—The Niagara Gorge Railway, Buffalo, N. Y., has filed with the Public Service Commission for the Second District a new tariff schedule, relative to commutation fares which will become effective on Sept. 1. Ten-trip individual, twenty-trip family or firm, forty-six-trip monthly school and sixty-trip monthly individual between Niagara Falls, Lewiston and Youngstown and local points will be advanced approximately 10 per cent.



**Washington to Ask More.**—Application for authority to charge an increased rate of fare on all its lines will be made to the Public Utilities Commission by the Washington Railway & Electric Company, Washington, D. C. The exact measure of relief to be sought has not been determined. It may take the form of a request for a straight 5-cent fare or a 6-cent fare with the privilege of buying five tickets for a quarter. In addition, a 1-cent transfer charge may be proposed.

**Want Franchise Revised.**—Charles S. Thrasher and Charles M. Leslie, receivers of the Interurban Railway & Terminal Company, Cincinnati, Ohio, have filed with the Commissioners of Hamilton County an application for a revision of the franchise of the company in such a way as to eliminate all restrictions as to the rates of fare and the manner of operation. Should this be granted, the company will then ask the Public Utilities Commission to fix the rates of fare to be charged.

**One-Man Car a Fixture.**—The one-man car has come to Dallas, Tex., to stay, according to Richard Meriwether, general manager of the Dallas Railway. Mr. Meriwether explained that the one-man cars now in service on the Akard-San Jacinto line have proved satisfactory to patrons and to the company. Additional one-man cars have been ordered and will be installed on other lines as soon as they are received. The skip-stop plan of operation will be put into effect on all lines in Dallas at once.

**New Jersey Rehearing on Aug. 29.**—The Board of Public Utility Commissioners of New Jersey announced at the close of a conference on Aug. 7, that it would sit at Newark on Aug. 29 to hear arguments upon the petition filed by the Public Service Railway asking a reopening of the fare case in which it petitioned for a 7-cent fare, 2 cents for a first transfer and 1 cent for a transfer on a transfer. The company was recently allowed to charge 1 cent for transfers, but was refused an increase in the cash fare.

**Gary Wants Six Cents.**—The Gary (Ind.) Street Railway has filed a petition with the Public Service Commission of Indiana asking for a 6-cent fare in and between the cities of Gary, East Chicago and Hammond and for an 8-cent fare for certain other towns. The recent order of the War Labor Board, increasing the wages of motormen and conductors, will cost the Gary Street Railway approximately \$55,000 a year. The company seeks additional revenue in order to compensate it for this increase in expenses.

**Receiver Would Increase Fares.**—C. J. Minton, receiver for the Winona Interurban Railway, Warsaw, Ind., has filed a petition with the Public Service Commission of Indiana, for authority to increase fares on the Winona & Warsaw Railway, operated by it under lease. Tickets always have sold for 5 cents, or six for 25 cents between any

two points on the Winona & Warsaw Railway. It is asked that the rate be increased to 6 cents per ticket and the right to issue commutation books of twenty tickets each for \$1.

**New York Inquiry Adjourned.**—The hearing before the Public Service Commission of New York, in regard to the general condition of all the surface electric railways in New York City, was continued on Aug. 14 and then adjourned for a week. Some data were presented to the commission in answer to the various queries noted in the issue of Aug. 10, but as a rule the companies had found themselves unable to have the information ready, because of its amount and the shortage of accounting help.

**Spokane Interurban Rates Increased.**—The State Public Service Commission of Washington, in an order which it issued on July 30, upholds the advance in rates of the Washington Water Power Company, Spokane, on its interurban electric lines from Spokane to Medical Lake and Cheney, placing the passenger and freight rates on a parity with the government rates on steam roads. The new tariff calls for 3 cents a mile for passenger rates and a 25 per cent advance in freight rates. The changes just noted went into effect on Aug. 1.

**Resort Line Allowed Increase.**—An order permitting the Five-Mile Beach Electric Railway, Wildwood, N. J., to increase its fares from 5 cents to 6 cents has been filed by the Board of Public Utility Commissioners of New Jersey. This increase is in the nature of a war surcharge, to be abolished when conditions warrant a return to the original 5-cent fare. One of the main considerations of the commission in granting this increase was that this company serves coast resorts and does 75 per cent of its annual business in July, August and September. In the remaining months of the year the business is very light.

**Preparing for the Unregulated Jitneys.**—Paving the way for unregulated jitneys in Portland, Ore., Dan Kellaher, City Commissioner, recently introduced an ordinance repealing an ordinance passed by the Council requiring franchises for all automobile buses operated over definite routes. No vote was taken on the measure, although it is understood all members of the Council favor the repeal of the existing regulatory measure. Members of the United Motor Bus Company are still endeavoring to complete the organization of a company to operate 100 jitney buses, but no recent reports of progress have reached the members of the Council.

**Mileage Rate Increase Allowed.**—The Public Service Railroad, Newark, N. J., on Aug. 10, was permitted by the State Board of Public Utility Commissioners to charge 2½ cents per mile, and 10 cents minimum to apply to districts where the company operates on its private right-of-way. Between Chrome

Junction and Chrome, however, the fare will be 5 cents each way. The old rate was 2 cents a mile. The Public Service Railroad is included in the system of the Public Service Corporation of New Jersey, which also controls the Public Service Railway. The filing of the new schedule for the Public Service Railroad was referred to in the *ELECTRIC RAILWAY JOURNAL* of Aug. 10, page 263.

**New Atlantic City Fares Suspended.**—The Board of Public Utility Commissioners of New Jersey has announced that a hearing will be held on Sept. 24 in the matter of the increase of fare between Atlantic City and Longport by the Atlantic City & Shore Railroad. The commission has ordered the suspension of the increases in the existing fares until Oct. 13 next unless the board prior to this date determines that the increases are just and reasonable. The increase is from 5 cents to 6 cents. The same ruling prohibits the advance in the 100-trip books to Longport from Atlantic City from \$5.25 to \$7. The company planned to put the new fares into effect on Aug. 6.

**Seven Cents in Hattiesburg.**—The Hattiesburg (Miss.) Traction Company on Aug. 1 put a new schedule of increased fares into effect and, if the new standard of fares is maintained, motormen will continue to receive the increase of 2 cents an hour in their pay, which took effect on the same date. The cash fare rate is 7 cents, while books of twenty tickets are sold for \$1.25, or 6¼ cents a trip. The franchise of the Hattiesburg Traction Company does not provide any rate of fare, and to meet the rapidly mounting cost of labor and maintenance and construction material, the officials desired to put the increased rate of fare into effect without awaiting approval of the Commission of Mississippi.

**Company Appeals Montreal Fare.**—The Montreal (Que.) Tramways has appealed to the Public Utilities Commission of Quebec from the finding of the Montreal Tramways Commission fixing for the uniform tariff territory a cash fare of 6 cents plus 1 cent for transfers or five tickets for 25 cents with an extra cent for a transfer. There are also eight appeals by municipalities from the decision of the commission. According to T. L. Perron, representing the company, it will cost the company 6.3 cents for each passenger carried. The company wants a 7-cent cash fare with four tickets for 25 cents. The decision of the City Commission fixing the fares under the terms of the recently enacted franchise was reviewed in the *ELECTRIC RAILWAY JOURNAL* for July 13, page 78.

**New Buffalo-Niagara Falls Rates.**—The International Railway, Buffalo, N. Y., has increased its rate of fare on the new fast service electric line between Buffalo and Niagara Falls. The round-trip fare of 60 cents has been discontinued and a one-way fare of 54 cents has been established. Passengers holding tickets valid on the old



Niagara Falls line will be charged an additional one-way fare of 19 cents on the new line. The new rates became effective on July 30. Fifty cents will be the fare charged by the International Railway on the old line between Buffalo and Niagara Falls and Buffalo and Lockport and Lockport and Niagara Falls after Aug. 22, according to a new tariff filed with the Public Service Commission. The one-way cash fare on these lines has been 35 cents.

#### Changes in Norfolk Southern Fares.

—Under a new rate scale on the electric division of the Norfolk Southern Railway, Norfolk, Va., which went into effect on July 28, the minimum fare is 10 cents instead of 5 cents. The fare to Virginia Beach, however, under the new rate, has been reduced to 42 cents each way, plus the war tax, making the round trip cost about 90 cents. The following statement was issued in connection with the new rate schedule: "The reduced fares on the electric division will become effective on July 28 as follows: Standard one-way fares, 2 cents per mile; minimum charge, 10 cents. Between Norfolk and Virginia Beach and Cape Henry and stations between Virginia Beach and Cape Henry—one-way fares—40 cents, via either route. Round-trip fares between Norfolk and Virginia Beach and Cape Henry via either route, 64 cents. Tickets on sale Saturday and Sunday, with final limit returning the following Monday."

#### Says Franchise Provisions Control.

—The Hamilton (Ont.) Radial Railway, controlled by the Dominion Power & Transmission Company, Ltd., in a judgment handed down by the Railway Board on July 17, is allowed to increase its passenger rates to those enjoyed by the London & Port Stanley Railway (recently increased by an order of the board), subject, however, to the limitations created by the municipal franchise by-laws. The judgment states that this restriction is likely to prevent any relief whatever being granted the company. The company's application for an increase in rates was opposed by the city of Hamilton, the towns of Burlington and Oakville and other municipalities, because of agreements with the radial company as to rates. The Railway Board rules that it is bound by the municipal by-laws, and ought not authorize any tariff which would create charges higher than those stipulated in the different municipal by-laws.

**Los Angeles Fare Brief Filed.**—City Attorney Stephens of Los Angeles, Cal., on July 27 on behalf of the municipality, filed with the State Railroad Commission his brief in the matter of the application of the Pacific Electric Railway for authority to increase fares. Evidence on this application was taken before members of the commission a short time ago. In his brief Mr. Stephens says: "It would seem to me that this whole proceeding should be considered one of apparent emergency, and if increases are granted, and, to be very frank with the commission, we must admit that the testimony as it now

stands would justify certain raises, that they be considered as temporary, and subject to change when the valuation is completed, operation more carefully checked, and economies put into operation." Mr. Stephens urges that the shipyard situation should be considered separate and apart from any other condition of the system, as this abnormal business has not required large expenditure of capital and is for a specific purpose, resulting from the existence of the war.

#### Hearing on Proposed Fare Increase.

—The Chautauqua Traction Company and the Jamestown, Westfield & Northwestern Railroad have filed with the Public Service Commission for the Second District of New York, a tariff showing changes in their passenger and commutation fares which they propose as effective on Aug. 23. Proposed new rates are substantially the same as those put into effect on June 10, 1918, when the companies claimed that control and operation were taken over by the Director General of Railroads in Washington. The Jamestown, Westfield & Northwestern Railroad proposes to discontinue the sale of 250-mile tickets, and 1000-mile tickets are to be advanced from \$17.50 to \$25. Tickets sold prior to Aug. 22 will not be honored except on payment of ½ cent per mile on 250-mile tickets and ¾ cent a mile on 1000-mile tickets. Unused portions will be redeemed at the per-mile rate of the price paid. A complaint against the proposed increases has been filed by about 200 patrons. The commission will order a hearing on the proposed increases.

**No Change in School Fares.**—There will be no increase in the price of school tickets and special calendar monthly commutation book tickets by the Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., according to notice received by the Public Service Commission for the Second District. When the railway was granted permission to increase its rate of fare from 5 cents to 6 cents, it filed a tariff, which it proposed to put into effect on July 16, making increases in the price of school tickets and special commutation book tickets. The commission's order permitting the increase to 6 cents stated that the order did not relate to the school tickets or the special ticket books and the commission on its own motion suspended the increased rates, pending an investigation by Chairman Hill. There was one hearing at Poughkeepsie and an adjourned hearing was scheduled for July 24. It was not necessary to hold the July 24 hearing as the company notified the commission that it would accept existing rates for this class of passenger traffic and that it would amend the tariff on file with the commission.

**Change in Peekskill Tariff.**—The Putnam & Westchester Traction Company Peekskill, N. Y., filed with the Public Service Commission for the Second District of New York changes in its tariff rates, effective on July 23, as

follows: Local fares between any two stops within a specified zone reduced from 7 cents to 6 cents. Transfers established in connection with any fare paid from points within zone 1, all stops within Peekskill and to and including Williams Mills, at 2 cents each, good over the lines of the Peekskill Lighting & Railroad Company from the South Street switch to the New York Central depot, Locust Avenue and Montrose and points between. The Peekskill Lighting & Railroad Company proposed to put into effect on July 23 a change in its tariff regulations by which transfers were established at 2 cents each in connection with any fare paid within zone 1, all stops within Peekskill and on main line division to and including Locust Avenue, and on Verplanks division to and including Montrose, good over the lines of the Putnam & Westchester Traction Company to Williams Mills.

**Fare Increase in Levis.**—The Levis (Que.) County Railway applied recently to the four municipalities in which it operates for permission to increase its passenger fares, which were fixed by franchise and ratified by the Quebec Legislature. The fares which have been in force are: Cash fare, 5 cents; unlimited tickets, six for 25 cents; scholars' tickets, fifty for \$1.25. The company applied for the following new rates: Cash fare, 10 cents; unlimited tickets, twelve for \$1; workmen's tickets, sixteen for \$1; children not in arms and scholars under sixteen years of age, fifty tickets for \$1.50. An agreement has now been reached under which the cash fare is advanced from 5 cents to 10 cents. Unlimited tickets will be sold, eight for 50 cents, or fifty for \$3, instead of six for 25 cents as heretofore. Children, not in arms and under twelve years of age will be charged a cash fare of 5 cents or ten tickets for 25 cents; scholars will be sold fifty tickets for \$1.50.

**New Haven Ordered to Remove Discrimination.**—In the case of Herman W. Gersch vs. the New York, New Haven & Hartford Railroad, the Interstate Commerce Commission has found that the maintenance of commutation fares and special fares for school children between Providence, R. I., and points on the company's Bristol, R. I., branch lower than between Providence and Touisset, South Swansea and Fall River, Mass., for like distances, results in undue prejudice to Touisset, South Swansea and Fall River. It has therefore ordered the company to remove, on or before Sept. 2, and thereafter to abstain from practicing, the undue prejudice found to exist. This order is to continue in force for a period of not less than two years from the date it is to take effect. The stations in question are on defendant's Providence, Warren & Bristol branch line, a standard gage railroad operated by electricity and extending from Providence to Warren, R. I., where it forks into two branches, one to Bristol, and the other through East Warren.



## Personal Mention

M. J. Fox has been appointed purchasing agent of the Columbus (Ga.) Railroad to succeed D. A. Turner.

R. S. Walker has been appointed treasurer of the Pacific Coast Railway, Seattle, Wash., to succeed J. W. Smith.

William Bennetts has been appointed electrical superintendent of the Western Light & Power Company, Boulder, Col., vice Harley Hard, resigned.

Fred W. Murphy has resigned from the position of master mechanic and electrical engineer of the Chicago, Ottawa & Peoria Railway, Ottawa, Ill., to accept the position of master mechanic of the Rockford & Interurban Railway, Rockford, Ill.

Edward L. Moreland, a member of the firm of D. C. & Wm. B. Jackson, Boston, Mass., has recently been called for by General Pershing and has been commissioned a captain in the engineer officers' reserve corps. Mr. Moreland expects to go abroad shortly.

Frank W. Laas has been appointed superintendent of the Western Light & Power Company with headquarters at Boulder, Col. Mr. Laas was formerly superintendent of power of the Iowa Railway & Light Company, Iowa Falls Electric Company, and Iowa Electric Company, Cedar Rapids, Ia.

Clifton Reeves, representative of the United States Department of Labor, who has been in Buffalo and other cities investigating electric railway problems for the government, has resigned, to accept a position to look after the labor interests of the Curtiss Aeroplane & Motor Corporation in Buffalo.

H. U. Wallace for the last six years vice-president and general manager of the Western Light & Power Company with headquarters at Boulder, Col., has resigned and accepted appointment as major in charge of engineering and construction, Quartermaster's Department, with headquarters at Washington, D. C.

James Lukey, for the last five years inspector and chief inspector for the Wichita Railroad & Light Company, Wichita, Kan., has been appointed master mechanic for that company to take the place of J. A. Lawhorn, who has resigned to enter other work. Prior to 1913 Mr. Lukey served as night carhouse foreman for the Kansas City (Mo.) Railway.

I. N. Randall has resigned as assistant general manager of the Ocean Shore Railroad, San Francisco, Cal., to accept appointment as assistant in transportation, bureau of markets, United States Department of Agriculture, and has been assigned to the Pacific Coast with headquarters in San Francisco, having charge of all transportation matters for the Department

of Agriculture in the States of California, Oregon, Washington, Idaho, Utah, Nevada and Arizona.

C. T. Jones, a civil engineer, has been appointed inspector in the office of the Supervisor of Public Utilities of the city of Dallas, Tex., and has been assigned to the duty of supervising the checking of the number of cars in operation, number of passengers carried, number of passengers provided with seats, etc. These data are desired by the office of the Supervisor of Public Utilities to be used as a basis for intelligent action on complaints regarding service on the part of patrons.

H. A. Bennett, superintendent of employment of the Bay State Street Railway, Boston, Mass., since September, 1917, has been appointed general claim agent of that company to succeed W. A. Driscoll, who has resigned and entered the employ of the Hugh Nawn Construction Company as purchasing agent with headquarters at Philadelphia. Mr. Bennett is very well known in electric railway circles. He was long connected with the Fitchburg & Leominster Street Railway at Fitchburg, Mass., the service of which he entered in 1898 as carhouse foreman and dispatcher. He has always taken an active interest in the work of the American Electric Railway Claim Agents' Association and in 1911 was elected president of that association.

D. A. Hegarty has been elected vice-president of the Western Light & Power Company with headquarters at Boulder, Col., succeeding H. U. Wallace, resigned. Mr. Hegarty was formerly vice-president and general manager of the Little Rock Railway & Electric Company, Little Rock, Ark.; general manager of the New Orleans Railway & Lighting Company, New Orleans, La., when that company was operated by Ford, Bacon & Davis; general manager of the Houston Lighting & Power Company, and since last year has again been in the service of Ford, Bacon & Davis, working on appraisals, reports, increased fare and rate cases. Mr. Hegarty has taken an active part in the work of the American Electric Railway Transportation & Traffic Association, of which he was formerly president, and has served as a member of a number of committees of the National Electric Light Association and also of the Association for Municipal Improvements.

Dan G. Fisher, editor of *O. K.'d Copy*, first vice-president of the Dallas Advertising Club, and district vice-president of the Associated Advertising Clubs of the World, on Aug. 6 was presented with a gold emblem of the Associated Advertising Clubs of the World by Mayor Lawther of Dallas,

Tex., on behalf of the members of the club following a speech in which the Mayor told of Mr. Fisher's worth as a citizen and club member. Mr. Fisher was recently elected district vice-president of the Associated Advertising Clubs of the World at its San Francisco convention, and his election to that office was a distinct honor conferred upon the Dallas Advertising League. Dan Fisher is an all-around good fellow. He is well known to electric railway men throughout the entire United States but more particularly to electric railway and electric light and power men in the Southwest. In 1914 he was president of the Southwestern Electrical & Gas Association. Mr. Fisher was long connected with the electric railways controlled by the J. F. Strickland Company, which include the Dallas-Sherman, Dallas-Waxahachie and the Dallas-Waco Lines. He entered business in Dallas in the circulation department of the *Dallas Times-Herald*. While connected with the Strickland lines he was in charge of the publicity of the Dallas Power & Light Company, the Dallas Railway, the Texas Electric Railway and the Texas Power & Light Company. In 1914 he was made assistant general manager of the Strickland lines. In addition to being a former president of the Southwestern Electrical & Gas Association Mr. Fisher also served for several years as secretary of that association. *O. K.'d Copy*, the publication of the Dallas Advertising League, for Aug. 6 was a "Dan-fisher Number," printed "just to show you, Dan, that we issue *O. K.'d Copy* without a real editor occasionally." Of Dan Fisher it is said by those who know him best that "with ambitions that are lofty and attainments far beyond those of the average man, he is as plain as an old shoe."

## Obituary

Edgar R. Giaque, assistant superintendent of the Jefferson and allied lines of the Detroit (Mich.) United Railway, is dead. Mr. Giaque began his service with the company on Nov. 24, 1911, being assigned to the Clark Avenue carhouse.

Ray Tompkins, for seventeen years president of the Elmira Water, Light & Railroad Company, Elmira, N. Y., is dead. Mr. Tompkins was one of the leading bankers of Elmira, the head of a large wholesale business, a director in many local enterprises and the moving spirit in civic and charitable work. He died after an illness of many months.

George G. Caldwell, for a number of years construction engineer for H. M. Byllesby & Company, Chicago, Ill., died of heart trouble on July 27 at Ottumwa, Iowa, where he was engaged on special construction work for the Ottumwa Railway & Light Company.



# Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (\*) indicates a project not previously reported.

## Track and Roadway

**Connecticut Company, New Haven, Conn.**—The engineering staff of the Connecticut Company is busily at work on plans for the extension of the company's tracks on Boston Avenue, Bridgeport, which will give a direct route from the North End and from Stratford to the plant of the Remington Arms Company.

**Jacksonville (Fla.) Traction Company.**—The Jacksonville Traction Company is extending its line from the borders of Camp Johnston into the reservation to a point still to be decided upon.

**Gary (Ind.) Street Railway.**—Work will soon be begun by the Gary Street Railway on the construction of its Buchanan Avenue extension.

**Indianapolis Traction & Terminal Company, Indianapolis, Ind.**—The Board of Public Works has decided to issue an order to the Indianapolis Traction & Terminal Company to lay a single-track extension on North Illinois Street between Thirty-ninth and Forty-sixth Streets and grant the company a year to build it if the company will fill and curb an excavation made for double tracks.

**Louisville (Ky.) Railway.**—T. J. Minary, president of the Louisville Railway and the Louisville & Interurban Railroad, in a recent statement said that military activities at West Point and Stithton, Ky., would probably occasion no extension of the lines of the companies from Orell, Ky., to Hardin County.

**St. Louis, Mo.**—Preparations are being made to operate trolley cars over the new Free Bridge. The Chamber of Commerce of East St. Louis is interested. The franchise has been offered to the East St. Louis Interurban Electric Railway by the Municipal Bridge Commission but has not been formally accepted by the company. Overhead wires are being installed. It is understood that the plan has been suggested of using two one-man cars to furnish service at first.

**New Jersey & Pennsylvania Traction Company, Trenton, N. J.**—The City Commission of Trenton, N. J., has granted permission to the New Jersey & Pennsylvania Traction Company to run a spur into the terminal yards at Warren and West Hanover Streets, Trenton, so as to keep the large Princeton cars off the streets in discharging and admitting passengers.

Under the present arrangement it is impossible to comply with the so-called four-minute law prohibiting the halting of trolley cars on public thoroughfares.

**New York (N. Y.) Municipal Railway Corporation.**—The Public Service Commission for the first district of New York, has received bids for the construction of station finish for two stations on the Broadway subway, Manhattan, at Forty-ninth and Fifty-seventh Streets and Seventh Avenue, and also for a supply of untreated ties and timber for use on the rapid transit railroads. The unofficial totals presented show that A. W. King, at \$153,262, was the low bidder on station finish work, while J. H. Burton & Company, New York, with a total of about \$236,000, were the only bidders on orders for untreated ties and timber.

**Levis (Que.) County Railway.**—The Levis County Railway has awarded a contract for rebuilding its electric railway system to C. H. Jackson & Company, Quebec, and the National Cartage & Supply Company, Limoilou.

**Texas Electric Railway, Waco, Tex.**—Announcement is made by the Texas Electric Railway, that extensions of the lines will be made in Waco immediately that will give a line to Camp McArthur, the army cantonment near that city. The first line to be built will enter the government property in that section of the camp known as the replacement camp. The initial improvement calls for the laying of 7000 ft. of track and will cost approximately \$25,000. Later other lines will be built inside the camp boundaries.

**Municipal Railway, Tacoma, Wash.**—The Council of Tacoma recently accepted a proposition by C. C. Miller, president of the Commercial Lumber Company, to complete the Lincoln Avenue extension of the municipal car line with \$500 to be advanced by the company. The \$500 will be credited on freight to be hauled by the city for the company. The line will be completed to extend to the new mill of the lumber company on the Commercial Waterway.

## Shops and Buildings

**Sheffield (Ala.) Company.**—This company reports that an addition will be built to its workshop.

**Sand Springs Railway, Tulsa, Okla.**—A report from the Sand Springs Railway states that the company expects to place contracts within the next ten weeks for the construction of a new station at Tulsa.

**Schuylkill Railway, Girardville, Pa.**—A report from the Schuylkill Railway states that the company will construct an addition to its carhouse.

**Texas Electric Railway, Dallas, Tex.**—The Texas Electric Railway has completed a new passenger station at Waxahachie. The station is modernly equipped to care for passenger, express and baggage business.

**Petersburg, Hopewell & City Point Railway, Petersburg, Va.**—This company reports that a contract has been placed for the construction of an extension to its carhouse.

## Power Houses and Substations

**Sheffield (Ala.) Company.**—This company reports that it expects to purchase a new ash-handling outfit. A new 500-kw. rotary and one 300-kw. motor-generator set have been purchased by the company.

**Arkansas Valley Railway, Light & Power Company, Pueblo, Col.**—A new transmission line will be built by the Arkansas Valley Railway, Light & Power Company to two new alfalfa mills being erected in the Arkansas Valley district, between Ordway and Crowley. Energy will also be supplied to several ranches on the line.

**Dallas Power & Light Company, Dallas, Tex.**—A new brick and concrete addition to its power house, to cost about \$15,000, will be built by the Dallas Power & Light Company, which supplies energy to the Dallas Railway.

**Washington Water Power Company, Spokane, Wash.**—That the Washington Water Power Company is to be called upon to expend \$750,000 on its Long Lake plant to meet the demands of the Chicago, Milwaukee & St. Paul Railway for power was information given the State Public Service Commission recently at the valuation hearing. D. L. Huntington, the president, said: "Verbal notice has been given to the company that the International Power Company, which buys power for the Milwaukee electrification system, will exercise its option for an additional 5000 hp., making a total of 15,000 hp. in all. The power company will have to meet this demand when it is made formally, although the company, while paying for the first 5000-hp. power unit, is not using any now."

**Charleston-Dunbar Traction Company, Charleston, W. Va.**—Work is under way on the excavations for the foundations of the new power house of the Charleston-Dunbar Traction Company at Dunbar, to replace the one destroyed by fire last December. The new building will have a floor space of 50 ft. x 92 ft., being considerably larger than the former power house. The new power house will be located on the site of the old one, immediately adjoining the carhouse, from which it will be separated by a fire wall.



# Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

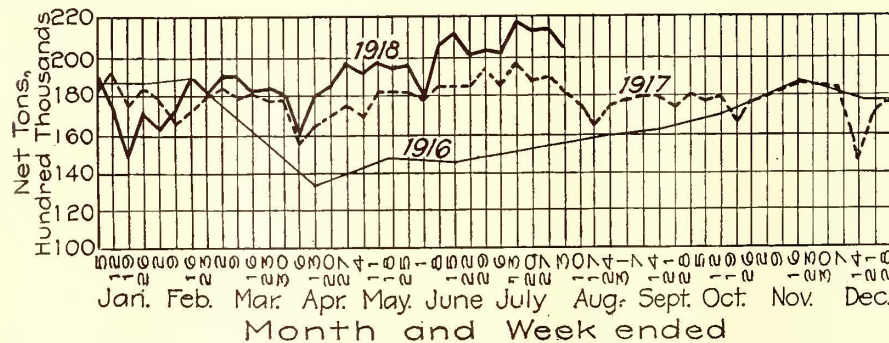
ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

## Coal Production Still on the Decrease

Bituminous However, for Week Ended Aug. 3 Shows 14.3 per Cent Increase Over 1917

During the week ended Aug. 3 the output of bituminous coal not only decreased more than 3 per cent, but recorded the third successive week of decreased production, according to the regular weekly report of the U. S. Geological Survey. Production of bituminous coal (including lignite and coal coked) during the current week is estimated at 12,422,000 net tons, a decrease compared with the week preceding of 398,000 net tons, but an increase over the same week of 1917 of 1,563,000 net tons or 14.3 per cent.

The average production per working day during the week of Aug. 3 is estimated at 2,070,000 net tons as compared with 2,137,000 net tons during the week of July 27 and 1,810,000 net tons during the week of Aug. 3, 1917.



ESTIMATED AVERAGE TOTAL PRODUCTION PER WORKING DAY OF BITUMINOUS COAL, INCLUDING COAL COKED

Shipments during the past week decreased from all districts with the exception of Cumberland-Piedmont and Somerset, Tennessee and Kentucky and Iowa, Texas and the Southwest States. The increase from the Cumberland-Piedmont district was 7 per cent, from the Tennessee and Kentucky district 5 per cent and from the district including Iowa, Texas and the Southwest States 4.8 per cent. Material decreases in shipments for the week were as follows:

Western Pennsylvania 6 per cent, Ohio 3.6 per cent, the district including northeastern Kentucky, high volatile of southwest Virginia and Virginia anthracite fields 7.8 per cent, southwest Virginia 16.8 per cent, Alabama 17 per cent and the district including Illinois, Indiana and western Kentucky 6.1 per cent.

Anthracite shipments during the

week ended Aug. 3 decreased 1310 carloads or 3.2 per cent, the total movement amounting to 39,632 carloads.

## Expeditionary Force to Get Rails and Cars

Orders for This Equipment Distributed Among Five Rail Mills and Eight Car Builders

The Director of Steel Supplies, through the steel products committee of the Iron and Steel Institute, it is learned, has distributed an order for 200,000 tons of 80-lb. type "B" rails among the manufacturers for shipment to the United States Expeditionary Force in France. The specifications call for shipment of 40,000 tons per month to begin immediately. Bessemer or open-hearth rails may be shipped at the option of the mill. The price has not been fixed, but will be adjusted after the government and rail mills have come to an agreement.

## Conditions in Iron and Steel Scrap Market

Reasons Why Some Sellers May Not Receive Maximum Prices Set by Government

The supply of scrap iron and steel has not materially increased. Sellers such as traction companies, however, may not be able to obtain the maximum prices set by the government owing to the conditions obtaining in the yards of the scrap dealers. Labor is scarce and consequently it is very difficult to grade the material in the yards. Because of the different classifications of scrap and the accompanying prices it is more necessary than ever.

Supplies in the yards have accumulated and consequently dealers in scrap are not so anxious to increase their holdings at the maximum prices. If a sufficient and satisfactory supply of labor could be had at the scrap yards it seems probable that there would be greater competition for the miscellaneous scrap, such as accumulates around carhouses and shops.

At any rate close market observers are firmly of the opinion that the supply of scrap will diminish as time goes on. In that event the dealer demand for scrap iron and steel should pick up and naturally prices with it.

## Steel Trolley Poles in No Great Demand

Market Quiet and Price Revisions Infrequent—Five per Cent Advance in a Month

Just now, in common with other equipment, steel trolley poles are not being bought by the traction lines in any surprisingly large quantities. In other words, the market is very quiet. It appears inquiries for this material are also below normal as there is very little new construction work under way or contemplated. Deliveries are very good; that is to say, shipments out of stock can be made in thirty days. Prices have changed little within a year. From 1915 to 1917 there was an advance of about 37 per cent. Six months ago steel trolley poles were increased 1 cent a pound. Within a month 5 per cent was added.

Leading manufacturers report they are not having any trouble getting steel material. It comes through from the mills in fairly good time and in adequate amounts to fill orders. Of course, each producer and also his selling agents must sign the War Industries Board's raw materials pledge.



## Time to Lay In Stock of Gear Cases

Conditions in Iron and Steel Market May Make It Difficult to Get Delivery Later

To what extent electric cars may have to be operated for shorter or longer periods of time without gear cases is as yet merely a matter of speculation. Certain it is, however, that unless road operators face conditions squarely and anticipate their requirements in a way designed to take care of the persisting shortage of raw material and other delivery delaying factors they may find the stock exhausted and the demands from the repair shops insistent.

The condition of the raw material market to-day is worse when demand is considered than it ever has been in the history of the industry. Even with the tremendous volume of iron and steel that the mills are now turning out the country faces a shortage of this material. All industries not essentially of a war nature are being made to curtail through inability to get iron and steel, in some cases to the extent of 100 per cent. In order to get iron and steel now a manufacturer must show that the material is to be used for ultimately.

Some manufacturers have a supply of steel on which they can draw for ordinary commercial requirements, but after this stock is gone it will not be easy to convince the government that a further stock is necessary.

While gear cases have been made the theme of these remarks the same statements will apply equally well to other products made of iron and steel. The wise manager therefore will endeavor to anticipate his requirements as well as prepare to repair such parts as are capable of being repaired. With the winter season coming on when the wear and tear on the system is greater the necessity for quick action looms up larger to-day than it has in previous months.

## Hoist Manufacturers Discuss War Service

Plants Heavily Booked for Government Orders, and Problem of Securing Raw Material Becomes Critical

The Electric Hoist Manufacturers' Association held its June meeting at Montour Falls, N. Y., where the members of the association were the guests of the Shepard Electric Crane & Hoist Company. The general topic of the meeting was war service, and the general discussion was directed along lines for co-ordinating the experience and facilities of the electric hoist manufacturers to be of the most direct and efficient service to the government for war requirements. The electric hoist manufacturers are heavily booked up on government orders for war purposes, and the problem of securing raw material sufficiently in advance to meet

government requirements promptly has become a critical one. The consensus of opinion of the electric hoist manufacturers is that government orders for war purposes should take precedence over all other orders, and if war requirements call for the complete output of all of the manufacturers of electric hoists, it will be desirable to refuse all other business.

## Official Copper Price Continued at 26 Cents

Buyers May Make Contracts for Delivery After Nov. 1 on Basis of Delivery Price

At the conference of copper producers with the price fixing committee of the War Industries Board on Aug. 7 the official price of 26 cents for copper was continued in effect until Nov. 1. The producers, it is understood, had made representation for a higher price, while the consumers showed the dissatisfaction that would result from such frequent changes in the official price.

It was stated at the meeting by Mr. Brookings that the government had sufficient copper in sight for its needs. In such a case it was recognized as being useless to urge a higher price on the basis of greater production.

Also producers may accept orders for delivery after Nov. 1 at the price ruling on delivery. This is expected to stop the slowing up in buying a few weeks before to a price-fixing meeting.

It would not be unreasonable to suppose that this order will be passed on to the consumer of copper products to a much larger extent than is now the case. In the past two years a number of manufacturers have taken the position that the contract price is that ruling at the time of delivery. This has not been done by the majority of manufacturers, however.

A number of manufacturers in the first few days in August withdrew their prices owing to an expected change in the price of copper. Whether these concerns will continue to give only day-by-day prices or will quote as of delivery or will issue new prices is not known.

As soon as the government announced its decision copper buyers came into the market and orders for a considerable quantity of the metal were placed.

The conditions imposed by the government are: First, that the producers of copper will not reduce the wages now being paid; second, that they will sell to the United States government, to the public in the United States, and to the Allied governments at not above the maximum price; third, that they will take the necessary measures, under the direction of the War Industries Board, in the distribution of copper to prevent it from falling into the hands of speculators, who might increase the price to the public; and, fourth, that they will pledge themselves to keep up the production of copper to meet war needs.

## Rolling Stock

Radford (Va.) Water Power Company reports that it expects to purchase one single-truck pay-as-you-enter one-man car.

Columbus (Ga.) Railroad advises the ELECTRIC RAILWAY JOURNAL that the order recently placed for six Birney cars and stipulating shipment some time in November, has been canceled.

Seattle (Wash.) Municipal Street Railway reports that it has ordered twenty-five double-truck four-motor passenger cars. In addition the railway furnishes the following specifications on six one-man Birney cars ordered on July 19. These are the specifications required of the car builders. However, stock cars conforming substantially to these specifications will be acceptable by the railway, because immediate delivery is desired.

Number of cars ordered.....6  
 Name of road...Seattle Municipal Railway  
 Date order was placed.....July 19, 1918  
 Date of delivery.....2 cars Sept. 1, 4 cars Nov. 1, 1918  
 Builder of car body.....American Car Co.  
 Type of car...One-man, standard Birney  
 Seating capacity.....30  
 Weight.....13,000 lb.  
 Length over all.....27 ft. 9 3/4 in.  
 Truck wheelbase.....8 ft. 0 in.  
 Width over all.....8 ft. 0 in.  
 Height, rail to trolley base...9 ft. 9 in.  
 Body.....Semi-steel  
 Interior trim doors-sash, moldings, etc., Light mahogany  
 Roof.....Arched  
 Air brakes.....Westinghouse  
 Armature bearings.....Sleeve  
 Axles.....Hammered steel—Brill  
 Bumpers...3-in. 4-16 channel iron buffer-shield of No. 16 sheeted, Full width, round corners  
 Car signal system...Faraday or equal, one 9-in. foot gong each end  
 Car trimmings...Light mahogany and bronze  
 Control...Westinghouse, 506-A, 2 motors, K-10 double-end control  
 Curtain fixtures.....Curtain Supply Co.'s or equal  
 Curtain material.....Pantasote  
 Designation signs...Hunter's illuminated car sign, gas or equal  
 Door operating mechanism:  
 Deadman-control, Westinghouse, pneumatic control, motorman's valve  
 Fare boxes.....Furnished by purchaser  
 Fenders on wheelguards...Made in municipal carhouses  
 Gears and pinions.....Barnes' process, or equal  
 Hand brakes...Pittsburgh drop-handle—steel tubing, or equal  
 Heater equipment.....Consolidated Car Heating Co. or Peter Smith  
 Headlights.....Golden Glow No. 95m  
 Journal bearings.....Gurney ball bearing  
 Motors, type and number...Westinghouse, 506-A-2, inside hung  
 Paint, varnish or enamel...Best according to standard  
 Sanders.....Controlled through air-brake equipment  
 Sash fixtures.....O. M. Edwards, 13 1/2 M. D-1 sash lock or equal  
 Seats.....Hale & Kilburn, Walkover No. 300, 37-in. long, or equal  
 Seating material.....Hardwood slat seat, match interior  
 Slack adjuster.....Type E, automatic  
 Step treads.....Feralun 3 in. wide  
 Trolley catchers or retrievers...Earl catcher  
 Trolley wheels or shoes...Wheels No. 6177 type, 6-in. wheel  
 Trucks.....Brill spec. 78-M-1  
 Ventilators.....Utility Ventilator Co.'s  
 Wheels...Cast chilled, 24-in. dia., 3-in. tread  
 Special devices, etc...Two No. 4 semaphore lenses on both ends; G. E. Co. Keyless sockets, No. 60019; cars built in accordance with latest Nat. Code  
 Connecticut Company, of New Haven, Conn., will purchase through the United States government seventy new pay-as-you-enter type electric cars to cost \$10,000 apiece. The government will



pay for the cars and the traction company will rebuy them from the government in five years.

**Trade Notes**

Weiss Switch Lock Company, Springfield, Ill., has moved its offices from 312 South Fifth Street to 600 East Capitol Avenue.

American General Electric Edison Corporation of China, Schenectady, N. Y., has filed notice of an increase in its capital from \$500,000 to \$1,000,000, to provide for business extension.

Electric Process Company of Wilmington, Del., has been incorporated by M. L. Rogers, L. A. Irwin and W. G. Singer of Wilmington, Del. The company proposes to deal in steel, iron, etc.

E. P. Dillon, manager of the power division, New York office of the Westinghouse Electric & Manufacturing Company, has resigned to become general manager of the Research Corporation of New York.

American Gear Manufacturers' Association will hold its semi-annual meeting at the Onondaga Hotel, Syracuse, N. Y., on Sept. 19, 20 and 21. Announcement of the program will be given in a later issue.

Root Spring Scraper Company, Kalamazoo, Mich., has just shipped to the St. Louis Car Company a complete equipment of No. 2 snow scrapers and

Root spring fenders for the thirty cars which that company is building for the Saginaw Bay City Railway. This company and others allied with the Michigan United Railway have replaced all their snow sweeper equipments with Root scrapers and have had gratifying success.

Drew Electric & Manufacturing Company, Indianapolis, Ind., has received through its Chicago representative, Holden & White, Inc., what is probably the largest order for overhead frogs ever recorded. This is an order from the Chicago Surface Lines for 2500 overhead malleable-iron frogs for immediate delivery. The Drew Company is shipping a large amount of this from Indianapolis stock. During July, the Chicago Surface Lines also ordered 1000 malleable-iron overhead crossings.

Trumbull Electric Manufacturing Company, Plainville, Conn., has this week advised the trade that it has permanently discontinued the manufacture of armored cable, armored cord and flexible steel conduit, its schedules "X" and "Y." This step, the company states, was taken in order that it might devote its entire energy to other lines, including a large amount of government business, both direct and indirect, as well as its "safety service" externally operated line of knife switches. In taking this step the company has canceled all orders for the above materials now in its works, and no further orders, of course, will be taken.

**New Advertising Literature**

Trolley Supply Company, Canton, Ohio: A folder descriptive of its Simplex trolley base.

Beardslee Chandelier Manufacturing Company, Chicago, Ill.: Circular entitled "Better Lighting for Better Results" that describes the Denzar lighting unit for lighting factories, stores, shops, halls, hotel lobbies, hospitals, churches, public buildings, office buildings, apartment houses and schools.

Westinghouse Electric & Manufacturing Company: Catalog on wiring devices and carbon circuit breakers. In this 224-page, 8½-in. x 11-in. catalog are listed fuses, knife switches, service switches and boxes, solderless connectors, disconnecting switches, instrument switches, safety switches, safety panelboards, safety floor boxes and carbon circuit breakers, part of which have previously been listed in the company's old sectional catalog No. 3001.

E. I. du Pont de Nemours & Company, Wilmington, Del.: "Blaster's Handbook," in pocket form, with information regarding the proper explosive to use, the quantity, the method of loading and firing. It is profusely illustrated and contains charts and diagrams with references to other handbooks on special topics issued by the same company, among them "Hole and Post Holes," "Shale and Clay Blasting," "Roadbuilding and Maintenance."

**NEW YORK METAL MARKET PRICES**

	Aug. 7	Aug. 14
Copper, ingots, cents per lb.	26	26
Copper wire base, cents per lb.	29.25	29.25
Lead, cents per lb.	8.05	8.05
Nickel, cents per lb.	40	40
Spelter, cents per lb.	8.45 to 8.53	8.90 to 9.00
Tin, Chinese*, cents per lb.	92	90 to 90.5
Aluminum, 98 to 99 per cent., cents per lb.	†33.00	†33.00

\* No Straits offering. † Government price in 50-ton lots or more, f. o. b. plant.

**OLD METAL PRICES—NEW YORK**

	Aug. 7	Aug. 14
Heavy copper, cents per lb.	23½ to 24½	23.50 to 24.50
Light copper, cents per lb.	20 to 20½	20 to 21.50
Red brass, cents per lb.	21 to 22	21 to 22
Yellow brass, cents per lb.	14½ to 15	15 to 15.50
Lead, heavy, cents per lb.	7½ to 7½	7.12½ to 7.50
Zinc, cents per lb.	5½ to 5½	5½ to 5½
Steel car axles, Chicago, per net ton.	\$41.52	\$41.52
Old carwheels, Chicago, per gross ton.	\$29.00	\$29.00
Steel rails (scrap), Chicago, per gross ton.	\$34.00	\$34.00
Steel rails (relaying), Chicago, gross ton.	\$60.00	\$60.00
Machine shop turnings, Chicago, net ton.	\$16.25	\$16.25

**ELECTRIC RAILWAY MATERIAL PRICES**

	Aug. 7	Aug. 14
Rubber-covered wire base, New York, cents per lb.	30 to 37	30 to 37
Weatherproof wire (100 lb. lots), cents per lb., New York.	32.40	32.40
Weatherproof wire (100 lb. lots), cents per lb., Chicago.	37.50 to 37.72	35.00 to 37.72
T rails (A. S. C. E. standard), per gross ton.	\$70.00 to \$80.00	\$70.00 to \$80.00
T rails (A. S. C. E. standard), 100 to 500 ton lots, per gross ton.	\$67.50	\$67.50
T rails (A. S. C. E. standard), 500 ton lots, per gross ton.	\$62.50	\$62.50
T rail, high (Shanghai), cents per lb.	4½	4½
Rails, rdger (grooved), cents per lb.	4½	4½
Wire nails, Pittsburgh, cents per lb.	3½	3½
Railroad spikes, drive, Pittsburgh base, cents per lb.	4½	4½
Railroad spikes, screw, Pittsburgh base, cents per lb.	8	8
Tie plates (flat type), cents per lb.	*3½	*3½
Tie plates (brace type), cents per lb.	*3½	*3½
Tie rods, Pittsburgh base, cents per lb.	7	7
Fish plates, cents per lb.	*3½	*3½
Angle plates, cents per lb.	*3½	*3½
Angle bars, cents per lb.	*3½	*3½
Rail bolts and nuts, Pittsburgh base, cents per lb.	4.90	4.90
Steel bars, Pittsburgh, cents per lb.	5	5
Sheet iron, black (24 gage), Pittsburgh, cents per lb.	4.90	4.90
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb.	5.80	5.80
Galvanized barbed wire, Pittsburgh, cents per lb.	4.35	4.35

	Aug. 7	Aug. 14
Galvanized wire, ordinary, Pittsburgh, cents per lb.	3.95	3.95
Car window glass (single strength), first three brackets, A quality, New York, discount†.	80%	80%
Car window glass (single strength, first three brackets, B quality), New York, discount.	80%	80%
Car window glass (double strength, all sizes AA quality, New York discount.	82 & 3%	82 & 3%
Waste, wool (according to grade), cents per lb.	11½ to 22	11½ to 22
Waste cotton (100 lb. bale), cents per lb.	13 to 13½	13 to 13½
Asphalt, hot (150 tons minimum), per ton delivered.	\$38.50	\$38.50
Asphalt, cold (150 tons minimum, pkgs. weighed in, F. O. B. plant, Maurer, N. J.), per ton.	\$42.50	\$42.50
Asphalt filler, per ton.	\$45.00	\$45.00
Cement (carload lots), New York, per bbl.	\$3.20	\$3.20
Cement (carload lots), Chicago, per bbl.	\$3.34	\$3.34
Cement (carload lots), Seattle, per bbl.	\$3.68	\$3.68
Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.86	\$1.86
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.88	\$1.88
White lead (100 lb. keg), New York, cents per lb.	10½	10½
Turpentine (bbl. lots), New York, cents per gal.	63	63

\* Government price. † These prices are f. o. b. works, with boxing charges extra.