

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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T. & T. Association Will Consider Changes in Organization

AT THE Atlantic City convention changes in organization were considered not only for the American Association but for the T. & T. and Engineering Associations. In each of these associations they were recommended by the president and will be considered by the executive committee, with the possibility of course that a committee may be appointed in each body to work out the most satisfactory plan.

In the case of the T. & T. association, the first suggestion of the retiring president, R. P. Stevens, was that only one vice-president should be elected, the reason presumably being the same as that which prompted the reorganization committee of the American Association to propose that the method of electing vice-presidents in that body be changed so that there would be no order of precedence among the vice-presidents. One chief aim of this change was to do away with the plan usually followed of advancing each of the vice-presidents one step each year and thus avoiding the necessity of choosing a president four years before he will serve.

The argument in favor of a change in the T. & T. Association as well as in the American Association is not that the present plan has worked badly in the past. Both associations have been most fortunate as to the caliber of the men who have been called upon to serve as presidents of the associations. Nevertheless, there are good arguments in favor of giving the nominating committee a free choice, just as there are arguments for the present practice in the way of training vice-presidents for the presidency. If the T. & T. Association adopts the single vice-president plan there will be an opportunity of finding out how it will work out as compared with the four vice-president yearly promotion plan of the American Association. Somewhat curiously, in view of the adoption of the resolution at the 1920 session of the American Association in favor of getting away from the old system of advancement, the change was not even considered at the American meeting. The reason for this is probably that the association as a whole felt that a good many changes had been made and that it would be well to try them out before making others. As drafted, the constitution is thoroughly workable, and can easily be amended if such a plan should be considered desirable.

Other important suggestions by Mr. Stevens relating to the internal organization of the T. & T. Association were that the chairman of each committee be appointed if possible from the membership of the preceding year's committee, that the first vice-president of the association be ex officio chairman of the subjects committee, that two new committees be appointed to study the different phases of the trackless transportation subject and that *Aera* devote more space to articles of an educational nature for the benefit of employees in the transportation department. Altogether the address showed an earnest desire for improvement and a willingness to depart from precedent to accomplish that result.

Does the Engineering Association Constitution Need Revamping?

IN HIS ADDRESS before the Engineering Association at the Atlantic City Convention, W. G. Gove, retiring president, made some statements which seem at first rather startling. The address was taken up largely with suggestions as to ways in which Mr. Gove thought the functioning of the organization could be improved. He said frankly that these suggestions would not meet with universal approval. Probably they will not in detail, but they will in principle. The principle is that now is a good time to make a study of the workings of the association to learn whether some improvements may not profitably be introduced. This is timely now because the parent association has just completed such a study. The suggestion that a committee be appointed to go into this matter will meet with no opposition. If such a committee finds that present practice is satisfactory, the establishment of the fact will be worth while. The chances are ten to one that some changes will be found desirable.

To Mr. Gove's mind, the root of the trouble with committee work at present is that committee members have to pay their own expenses in attending meetings or else charge them to their expense accounts with their employers. There is some warrant for this conclusion, although the influence of the money item is probably not predominating. The way out would seem to be some kind of a mileage allowance, which would put all members on the same footing geographically, at least with respect to railroad fares. This is probably not practicable at once on account of the financial condition of the association, but the plan should be considered for adoption later.

Next, Mr. Gove wants committee work simplified. This is desirable and can be accomplished without changes in the constitution and by-laws. The executive committee appreciates the desirability of a simple program of committee work and will undoubtedly provide such for the coming year. Mr. Gove also wants more attention given to practical standardization. He suggests an advisory committee in the car design field to act as an intermediary between the manufacturers and the users. Such a committee could undoubtedly accomplish a great deal. The plan is worth a trial.

As to the "Engineering Manual," the retiring president voiced a rather general desire to have this invaluable reference book in more convenient form and in a form to insure up-to-dateness. The committee on standards has been struggling with this proposition for many years. It is a difficult one. If the volumes are bound up permanently and issued say every two years, there is much loss of good printed matter, but the appearance of each successive new volume insures the completeness of the Manual as of the date of issue. Now it is difficult, practically, to keep the loose-leaf books up to the minute. The bound volume idea, supplemented with reprints for those who do not need the complete volume, is worth pushing.

Mr. Gove's specification for a permanent secretary-engineer for the association is met in part at least by the circumstance that Executive-Secretary J. W. Welsh is an engineer by training and experience. When he was "Special Engineer" with the American Association, he acted as secretary of the Engineering Association. He will still remain an engineer and will consider matters from an engineering point of view, even with the title of secretary. While as executive-secretary he will have duties of a more general character than those which he performed as special engineer, he will be able to give engineering supervision to its proceedings. He can train some one to act as his deputy.

Finally, Mr. Gove made another important suggestion. This relates to the method of adopting standards, namely, that they be voted for on a "weighted" basis, the companies likely to be most affected having the greatest voting power. Mr. Gove quotes a precedent—the practice of the steam railroads as to certain standards. This scheme has much to recommend it but it would be complicated to apply to the electric roads. Conditions would be different if the use of standards was obligatory. Then, such a change might be necessary, but experience has shown so far that even those who vote for standards do not always adopt them.

The association should be grateful to Mr. Gove for his frankness in pointing out the spots in the organization which, after a year's presidency, he concluded needed improvement. Even if all of the details of his suggestions are not adopted, good has been accomplished by their suggestion. What is needed in any large body of specialists is the quality of alertness, the ability to sense the vital needs of an industry. This quality is illustrated in Mr. Gove's presidential address. Surely the association will note, assimilate and apply as many of his constructive comments as can at present be applied.

Bouquet Handed to Engineering Association Committee

A GOOD omen for the success of the coming year's work of the Engineering Association is furnished by the way in which the subjects committee has planned for the year's work. In the first place the committee conducted a considerable correspondence in advance, with a view to securing suggestions from qualified persons throughout the industry and the country. The response was gratifying. Then the committee held several meetings in advance of the convention and completed a tentative draft of a report. Every opportunity was given for advance consideration of the work for the coming year, President W. G. Gove's suggestion as to limiting the number of subjects to those most important being kept clearly in mind.

Then the committee placed the proposed assignments before the convention, inviting criticism. The effect of this procedure was at once apparent, especially as the assignments to the several committees were presented after the discussion of the reports of these committees respectively. If the committees next year are not satisfied with their assignments, surely they cannot hold the subjects committee responsible. Now, when the report of this committee goes to the executive committee for approval, the latter will know that nothing has been left undone to insure a good year's work.

The importance of early work in the assignment of subjects cannot be overestimated. On even such a low plane as the financial one, such work pays large divi-

dends. In round numbers, say that 100 committee men will each devote 100 hours of working time next year to committee duty, at \$5 per hour their time is worth \$50,000. Assume that by careful planning 10 per cent of this time could be saved. The saving would be worth \$5,000. It would, therefore, pay to spend a considerable amount in time and money to save this \$5,000, which would be only one part of the real saving.

Engineering Judgment in Valuation Procedure

ENGINEERS should take to heart the recommendation of the valuation committee of the American Association that there be a more extended use of the so-called "yard-stick" method of valuation. The committee points out that this is the most constructive program for study by the incoming committee and urges the new committee to examine the subject with a view of ascertaining how best or to what extent the method can be given more general application. The ELECTRIC RAILWAY JOURNAL has urged this procedure in valuation but has recognized that it is not only a question for valuation engineers or executives but also for courts and commissions. Examples of the use of this method are not unknown, the most conspicuous example in electric railway circles being the recent valuation of the Connecticut Company, already related in these columns.

One of the principal points in such a method of valuation, it should be noticed, is a recognition of the judgment of the engineer as playing an increasingly important and deciding part in the making of valuations. It would take the engineer from the class of a clerical counter of field details and place him in the rôle of a judge of types of construction, depending upon him to decide what variations in type are negligible or compensating in the building up of intelligent costs of construction. In general, it is a step forward for the engineer in his coming into his own, and he should be ready to do his part in making the move a constructive one for the industries involved.

It must further be recognized, of course, that this is only a step; that the final object will never be realized until the commissions and courts recognize his judgment, to the extent that it must be utilized in yard-stick valuation, as competent testimony. That is, the integrity or usefulness of testimony as to value must be strengthened rather than vitiated by this method of arriving at the figures. It is up to the engineer to prove his value in this respect. The committee's recommendation, however, is a good omen.

The Question of Price Is Left Untouched

THE rest of the report of the committee on valuation this year is notable for two things—one, the excellent discussion on rate of return which should supply good arguments for companies in rate cases, and, two, the absence of any discussion on the main feature of the work of the 1919 and 1920 committee, namely, that of price. This, we believe, is unfortunate. In times of rising and high prices, it was easy and self-satisfying to urge the adoption of present-day prices in making inventory in appraisals. But the real work in the application of such a principle comes in the days of falling prices which must be admitted to be upon us—happily in most instances. The question of the base price to apply is one which presents more serious or

debatable points than any other of the so-called tangible elements of valuation. Is it not logical that more constructive work should be done on it?

It is understood that in some of the companies now working up valuations of their properties, some very interesting and valuable experiments are being made to determine the effect of various pricing methods. This is a question in which the whole industry is interested, and it could be made one of the major subjects for the committee to work on. Because it is difficult is no reason to pass it up, but rather the best reason for attempting a solution. May next year's committee also consider this subject as a part of its work.

Bus Operators in the Amalgamated

NOTWITHSTANDING the fact that the association at its recent Atlantic City convention voted for the time being not to admit motor bus companies to membership, as was discussed in these columns last week, it was very evident from the remarks of many that the railways themselves are watching, analyzing or have actually established experimental bus lines as feeders in conjunction with their existing rail routes or as a supplement thereto.

That the employers do not for a minute underestimate the possibilities of the bus for exploitation services is also evident from the action taken by the Amalgamated Association at its recent Atlanta (Ga.) convention. Perhaps the employees are one step ahead of the railway men in looking over future possibilities. Their action surely indicates that they want to get in on the ground floor, so to speak, and as the bus develops in usefulness to gain new and additional members.

Can it be their idea that the motorbus is to supplant existing electric railways or is it simply an evidence of the ever-reaching demand of labor to try to dictate in all new modes of transportation in somewhat the same manner it did when one-man cars were first put into service?

The safety car was a necessity on the part of the railway companies to preserve their integrity—thereby really retaining for the men their jobs. Now comes the bus for exploitation service—an entirely different proposition. If the Amalgamated Association attempts to foist upon the companies operating these vehicles unnecessary demands they can only open the way for the irresponsible operator to exist. The arguments advanced regarding the use of the safety car to preserve their jobs and keep more men at work cannot now be used, as this is an opportunity of work for additional men, and that is what is today being discussed at all unemployment conferences.

Many companies will recollect the difficulties that they experienced at the hands of the Amalgamated Association when the one-man car was first put into operation—the arguments regarding safety of operation, the safety of passengers, the extra work that would naturally devolve upon the operator and the 101 other fool ideas that the grievance committees brought up in arguing for a higher rate of pay for operators of this type of car.

These arguments after four or five years of continued operation have resulted in the companies' recognizing the operator to be worth about 10 per cent more than on either end of a two-man car. What will be the differential for motor-bus operators?

Changing Ideas in Regard to Car Painting

IT IS false economy not to keep cars well painted and extravagance to carry the painting process too far. This sentence sums up the philosophy of the subject as well as its economics. The statement may seem trite, but an examination of the paint shop practice of the industry will show that there is great diversity in the interpretation and practical application of the principle thus stated. In fact it may well be said that electric railways have swung from one extreme of an excessive regard for appearance to the opposite extreme of an excessive regard for cost.

Obviously the first requisite of good painting is to preserve the car structure, which means primarily protecting it from the elements. Almost any paint or varnish will serve this purpose for a time, but the practical question is: How long will the preservative effect last? This is matter to be determined by experience; every master painter has his convictions regarding it. Modern methods of paint testing will give a reasonably correct answer for a given climate.

But preservation is only one function of painting. The effect on the public is equally important. Each electric car is a traveling advertisement which is seen by multitudes every day. Its appearance either commends or condemns the management. This fact has always been appreciated, and in the early days, when paint and painters were cheap, car finish was frequently overdone. Much rubbing down was indulged in, with the idea of yielding a carriage or piano finish. Gold leaf was liberally used on lettering and striping. The artistic taste of the craftsman was allowed to display itself in ornate corner ornaments and the like. Now these luxuries have been discarded largely, which is right. But the tendency to go to the other extreme is not right. Such a type of painting should be used and such a program should be carried out that the cars will appeal to the public by virtue of their tasteful neatness.

In this connection an important lesson has been learned, namely, that a simple painting process can be made to yield results almost as good as the more elaborate ones of the past, that is, when judged by car finish rather than piano finish standards. A car does not require a superfine finish for several reasons: First, it is in general viewed from a distance. Then it is examined very casually and transiently; it is the general impression created that counts. Again, if the public gives the matter any conscious thought at all, it will favor economy in the interest of lower fares.

However, while painting need not and should not be elaborately done, it should be regularly done. It does not pay to allow much difference in the appearance of cars, because contrasts are conspicuous. A master mechanic once said to the writer, in criticism of the painting program of his predecessor: "He used to varnish the cars every year whether they needed it or not." Maybe they didn't need it every year, but much could be said in favor of the practice. And in this case the body color had been preserved for twenty years or more by the expedient of frequent varnishing.

The paint manufacturers of the country have been pushing the slogan "Save the Surface." Of course they have "an axe to grind," but the principle they are promulgating is right. It applies especially well to car painting, with the addition, "and Advertise the Service."

The Lubrication of Rolling Stock

Incidental Results of Improper Lubrication Far Reaching—Direct Cost of Lubricants a Small Proportion of Operating Expenses—Methods for Packing, Oiling and Inspecting Affected by Local Conditions—Typical Organizations for Securing Lubrication

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IT TAKES oil and grease to lubricate the cars used on street railways; every one knows that fact. But how many railway operatives realize the importance of the subject of lubrication, and the absolute necessity for buying and applying lubricants on the basis of knowledge and not ignorance.

There really seems no one operating element that will pay better dividends than lubrication if studied seriously for the purpose of obtaining the tangible and intangible effects on the system's operation. Lubrication should not be dismissed by railway executives as an aggravating and unimportant element of operation which is best handled by purchasing the cheapest lubricants offered on a blanket bid and then function through the more or less able advice and work of oil company experts and unskilled labor.

The first cost of lubricants is the least important factor in lubrication; it pays to buy good lubricants, and the better the quality the higher the cost and the less quantity of lubricant needed. Poor lubricants

applied in an improper manner may result in a final cost that will be the largest element in operating expenses with the exception of labor. Lubrication affects the wear and tear on all equipment, it affects the service reliability of the system and indirectly public sentiment, it affects the life and rate of depreciation of equipment, it is a fundamental element in shop, labor and maintenance costs, and analysis

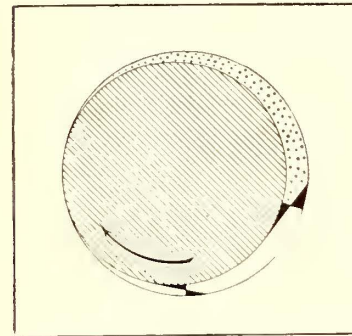


FIG. 1—OIL MOVES WITH ROTATING SHAFT

The rotating shaft tends to rotate the oil against the action of the bearing load.

and study warrant the statement that it is one of the most important operating factors in the railway industry, yet has received the least attention of railway executives.

The first cost and the quantity of lubricants used in the railway industry are difficult to determine; the following table shows an estimate for the yearly consumption and cost for the 90,000 motor cars and passenger trailers on electric railways in this country:

Lubricant	Quantity	Cost
Motor and compressor oil.....	1,600,000 gal.	\$650,000
Gear grease or compound.....	600,000 lb.	265,000
Cup grease.....	150,000 lb.	15,000
Other lubricants.....	20,000 gal.	100,000

In 1920 the United States consumed over 500,000,000 bbl. of crude oil, so the railway consumption represents only about 0.02 of 1 per cent of the total oil consumption and a still smaller percentage of the total quantity of lubricants used by the country. The cost

of these lubricants is not in excess of 0.1 of 1 per cent of the gross operating expenses of the industry.

In quantity and in cost, therefore, compared to national consumption and to other operating expenses, the item of lubrication is infinitesimal and not worthy of consideration. It is only because of the associated though intangible effects of lubrication on maintenance, service and operating methods that it is of importance and of interest to electric railway men.

Seemingly lubrication resolves itself into divisions relating to sale, purchase, storage and filling, systems of organization for oiling and packing and records and statistics to determine costs. Involved with these items from the standpoint of the railway operator are items such as reliability of service, cost of equipment, maintenance in relation to the cost of lubrication, effect of lubrication methods on rate and kind of depreciation on equipment, system inspection and labor costs and questions associated with public sentiment and relations.

The subject is very complicated and, depending on

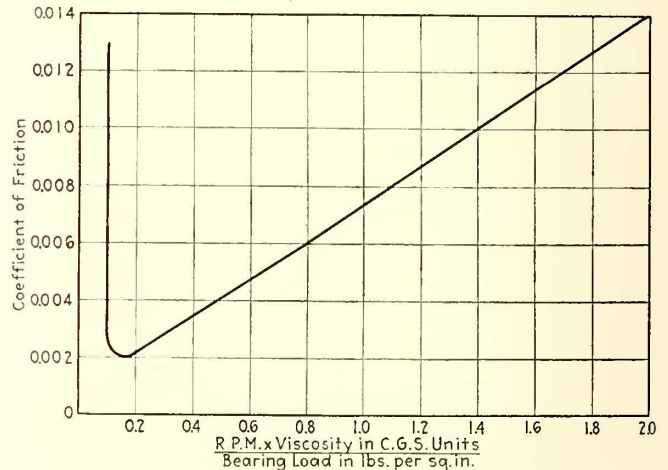


FIG. 2—CHARACTERISTIC CURVE FOR A RAILWAY BEARING

Test made in a Thurston machine. Shaft steel 3.97 in. in diameter, bearing, brass, 7.81 in. long, 3.31 in. chord of contact, 113 deg. arc of contact. Smooth surface, ungrooved cylinder, clearance 0.003 in. Loads 39, 135 and 155 pounds per square inch. Speeds 390, 230 and seizing speed from 15 to 50. Viscosities 0.5 to 0.15 C.G.S. Independent of load, speed and viscosity grouping all points fell on the curve.

the viewpoint, may be approached from many angles. As one master mechanic says, "All troubles on rolling stock of a serious nature occur because of one of two reasons, improper lubrication or the overheating of the motors." As a traffic man states the problem:

"I want to give service and keep all the rolling stock in service; if my failure to do this is caused largely by breakdowns due to faulty lubrication, then my policy is to play absolutely safe and get the best possible lubricant applied in the best possible manner."

The production and sale of lubricants to the electric railways is a specialty business of small volume and requiring the services of expert lubricating engineers.

Very largely railway companies have purchased their lubricants on a guarantee cost basis whereby the oil company, after a detailed study of the system and its equipment, guarantees a maximum cost of lubrication per 1,000 car-miles and absorbs a cost in excess of this figure, while the railway company gets the benefit of any cost less than the guaranteed cost. The oil company furnishes experts and proper lubricants and the railway company supplies the men and the facilities for lubricating its equipment in conformity with the directions of the oil company experts. The oil company sells both service and lubricants to the railway company.

The other basis of sale and purchase is the gallonage basis. This basis does not contain any guarantee clause fixing the cost per 1,000 car-miles, but fixes a contract price per gallon or pound of lubricant. The oil company

production of good lubricants—its business, and the railway company can devote its attention to the efficient operation of its equipment—its business.

Both systems of purchase have proved acceptable to railway operators and specific conditions and personal preferences usually decide the type of contract. As a general proposition, the purchasing agent desires to purchase all lubricants used by the railway company in all its operations from one company at the lowest price provided the grade of lubricants offered are satisfactory to the operating force.

The railway industry and the art of lubrication owes a great debt to the oil companies for the broad and helpful policies followed by their sales organizations and the expert technical services rendered by their lubricating engineers. It is a decided compliment to

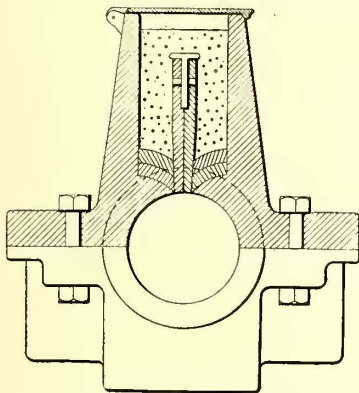


FIG. 3—GREASE CUP ARRANGED FOR OIL ON ARMATURE BEARING

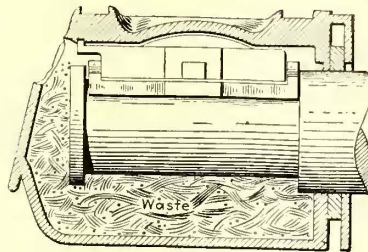


FIG. 4—SKETCH OF JOURNAL BOX AND PACKING

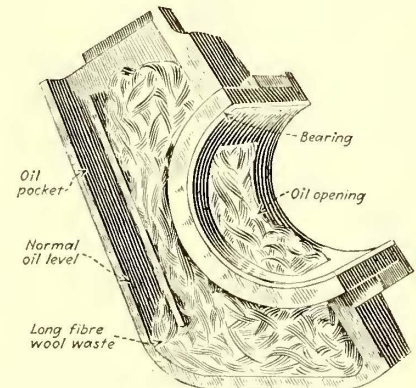


FIG. 5—SKETCH OF ARMATURE BEARING FOR SPLIT FRAME MOTOR

supplies expert lubricating engineers free of charge who function as advisers to the railway operators.

Some of the advantages claimed for the guarantee basis are:

1. The oil company sells service and not lubricants.
2. The maximum cost of lubrication for the ensuing year is a known item to the railway officials.
3. The railway gets the benefit of any saving obtained by keeping the cost below the guaranteed figure, while the oil company absorbs the excess. This statement must be modified when applied to those contracts which contain a clause which protects the oil company from any decided rise in the market price of oil.
4. The railway company has the services of lubricating engineers who strive to lower the cost of lubrication in order to increase their business by reducing the figure for the maximum guaranteed cost.
5. The railway company is relieved of managerial worry in regard to lubrication cost, methods or records.

Some of the advantages claimed for the gallonage basis are:

1. Lubricants are purchased on a purely quantitative basis at a figure fixed by the market price of oil.
2. The railway company is itself responsible for its lubrication and devises its system from the standpoint of efficient maintenance and service rather than lubrication cost.
3. Lubrication experts are available to the railway company who have no pecuniary incentive to advise the use of poor quality lubricants in too limited amounts.
4. The costs incidental to a detailed preliminary study of the system and its equipment are eliminated.
5. The oil company can devote its attention to the

the oil companies to have an almost universal statement from foremen, oilers and master mechanics in railway shops to the effect that "those oil company engineers know what they are talking about and we follow their advice with confidence." The company experts are relied upon to specify the type of lubricant and its method of application to all the equipment. In addition, the company men and the railway men co-operate enthusiastically to secure improvements in both lubricating methods and lubricants.

After purchase, the next question asked is, How shall lubricants be stored? The storage of any lubricant is accompanied by fire hazards and a dry fireproof room is a primary requirement. The increased number of distributing centers and warehouses established by the oil companies and the financial situation of most railway properties has forced the trend of practice to the use of a small room suitable for the storage of only one month's supply of lubricant. This statement is modified by local conditions and there are many large, splendid oil storage rooms used by railway systems. The A. E. R. A. in the Engineering Manual, Bb 1a, gives a standard layout for an oil house.

Even with only a month's supply of lubricant questions arise in regard to equipment such as containers and filling apparatus. It pays to purchase and install adequate containers and adequate filling devices. Waste of oil is eliminated, and only one glance at certain oil rooms indicates how great the waste may be, the fire hazards are reduced, records are more accurate because measurements are reliable and the equipment adds to the system morale by improving the appearance of the plant and by creating pride in the oilers.

The use of lubricants on rolling stock is intimately associated with the history of electric railway equipment. Axles and car journals were adapted directly from steam railroad practice, but the electric motor with its armature bearings, gears, etc., introduced new elements into equipment design. The first tendency was to take the bearings and lubricating arrangements of the motor or generator as used in shops or power houses and adapt them to the street car. Alas! for the oil rings and reservoirs—they refused to function, so there followed a long and expensive series of changes in the lubrication methods and in the bearing design for the motors. One of the early systems used a detachable oil or grease cup—the cups got lost or were broken. Then followed a bearing which had a grease or oil receptacle cast integral with the bearing; there was no way to insure a supply of lubricant to the shaft. The next step was to use a hollow metal tube to conduct grease from a main supply to the bearing. The heat from the bearing was conducted by the tube to the grease and, melting the grease, correct lubrication would occur by reason of the automatic supply of melted grease; it failed to be automatic.

A type of bearing and a system of lubrication was then introduced for the motor journals which, in general, depended on a wick feed to the shaft from an oil reservoir. Felt was used as the wick and was arranged and formed in many ways, but the general principle was to hold one end of felt on the shaft under pressure and to hold the other end in the lubrication supply.

The next step was the use of journal boxes with waste for packing similar to those used on the car journals and, in spite of attempts to use ball bearings, ring oilers, roller bearings and other equipment for both motor bearings and axle bearings, this system is standard in American practice. In some one-man cars, however, ball bearings are used for both motor and axle journals, and in Europe several systems use this type of equipment.

The bearings and the system of lubrication on the latest equipment, as regards boxes and waste packing for axle, and motor armature journals represent all the changes and improvements that could be expected to follow from many years of experience and observation with many types of equipment under varied conditions of service. It seems crude in many ways and has some glaring faults, but it maintains its place as the best system and design for use from an economic and operating standpoint.

The lubrication of flat surfaces, gears and pinions has not changed materially in method and increased efficiency has been obtained by an improvement in the quality of the lubricant.

Wheel flange lubrication, as applied by apparatus on the moving vehicle, is used only on electric locomotives in America where it has proved very satisfactory as an agency to reduce the wear on tires or on rails located on curves.

THEORY OF LUBRICATION

The essential problem in lubrication is to maintain a film of lubricant between moving surfaces. If this film is not maintained heating, wear of parts and rapid deterioration occur. In the street car there are rolling contact surfaces in parts such as motor and axle bearings and in sliding contact surfaces in other locations such as side and center bearings. The maintenance of the film of lubricant depends on the condition and material of the friction surfaces, the pressure or bearing

load on the surfaces, the contact velocity of the surfaces, the temperature of the surfaces and the lubricant, the viscosity, physical and chemical properties of the lubricant used and the method used to supply the lubricant to the surfaces. Many of these items can be controlled by the railway and oil company experts, but others are controlled by the service conditions to be met by the equipment and the design of the equipment.

A smooth surface permits smaller clearance between contact parts provided the design of the bearing permits the lubricant to be inserted at the proper places in sufficient quantity, but on motor bearings, for example, service conditions and reliability requirements cause the clearance to be larger than lubrication requires in order to allow no armatures to rub, alignments to change or other mishaps to occur under service operation.

FACTORS IN BEARING HEATING

The velocity of the contact surfaces both aids and prevents good lubricating conditions. A revolving journal, for example, gets covered with a thin film of oil and this oil film not only adheres to the journal as it rotates, but, due to its viscosity, carries around with it adjacent layers of oil and thus maintains lubrication. The higher the viscosity the greater this effect, but, on the other hand, the oil itself develops heat through molecular friction and this heat increases with an increase in the velocity and the viscosity, so that, unless the oil is cooled, the use of high velocity contact surfaces and of high viscosity oil will cause a decrease in the efficiency of lubrication because of the increase in the temperature.

The pressure between contact surfaces is detrimental to lubricating conditions since it pushes out the lubricant between the contact surfaces and decreases the thickness of the film. Designers of bearings care for this condition by inserting the lubricant on the contact surfaces where the bearing load is least, by utilizing the good features of velocity and by the use of lubricant having a high viscosity. The object is to get the lubricant to adhere to the contact surfaces and to supply more lubricant before the pressure breaks down the film or the lubricant is heated.

Lubricant of high viscosity is best to maintain a film under the adverse conditions of slow speed, high temperature and large bearing load, but, in general, the higher the viscosity the higher the first cost of the lubricant. Then again lubricant with a high viscosity develops more heat by molecular friction, requires greater clearances and is more difficult to handle but, in order to play safe and because viscosity decreases as the temperature increases, most operators demand a lubricant of high viscosity.

Lubricants may oxidize with age or heat, may gum, may evaporate, may be acid and cause corrosion, may emulsify or may "sludge," depending on the service conditions and the quality. But little criticism has been made of the lubricants used in the railway industry if used in sufficient quantity under prescribed conditions. Any criticism that arises is usually because the wrong type of lubricant was used on the specific job or because the lubricant was improperly applied to the contact surfaces.

As a theory and as regards the quality of the lubricants available, the lubrication situation is very satisfactory. The problem that remains and the one of the greatest importance to the railways is that of get-

ting and maintaining lubricants of the correct quality on the friction surfaces at a minimum cost for time, labor and materials.

MANY PARTS TO LUBRICATE

Street cars have many parts that need lubrication and, since they are of many types, of various ages and have many different equipments, the following table is merely typical of the parts, the method of lubrication and the type of lubricant used:

Part	Method	Lubricant
Armature bearings.....	Boxes and waste.....	Mineral oil
Axle bearings.....	Boxes and waste.....	Mineral oil
Journal bearings.....	Boxes and waste.....	Mineral oil
Gears and pinions.....	Intermittent adhesion	Patent compounds
Compressor bearings.....	Splash.....	Mineral oil
Center and side bearings.....	Intermittent adhesion	Grease
Brake rigging.....	Intermittent adhesion	Grease
Brake cylinders, control and trolley equipment.....	Intermittent adhesion	Vaseline
Trolley wheels.....	Intermittent adhesion	Sperm oil

In addition there are several parts such as air valves, equalizer bars, compression plates, door hinges and other mechanisms that require a small amount of lubricant at intervals.

Lubrication practice has not been reduced to a standardized basis even on an individual system, because it is impossible to find any system with uniform rolling stock of the same age and design and operating all cars under the same service conditions. An old car uses more lubricant than a new car. A suburban car uses more lubricant than a city car, because it usually operates at higher speed, is of different design, encounters rougher tracks and more frequently operates in water. These conditions result in a situation that requires intelligent supervision of lubrication on every railway system and makes impossible comparisons of lubrication costs on a 1,000 car-mile basis.

BEARINGS OF MANY TYPES

The most important parts of a car from a lubrication and service standpoint are the armature bearings, the axle bearings and the truck journal bearings. These bearings take the power and the hammer blows necessitated by service conditions, and a hot box on any one means a car out of commission. This results in a decrease in service and a direct cost of from \$50 to \$70 to remove the car, take out the bearings, put in a new bearing and to place the car back in service.

The method of lubrication for these bearings utilizes the journal box packed with waste which is soaked in oil. The general development of this type of bearing has been to have the waste packed on the side of the journal that is subject to the least bearing load while the oil is fed to the friction surfaces from the oil in the waste and in the reservoir through the action of capillary attraction. A supply of oil is retained in a well in the bottom of the bearing which can be gaged for depth and maintained at a constant level by use of the refilling tube which forms a part of the bearing.

Specific bearings differ very widely, however, not only in materials, arrangements and dimensions, but also in methods for securing adequate lubrication. Even on the same car the bearings and lubrication methods for the motor armature, driving axle and truck axle may differ materially.

On the motor armature bearings, for example, special precautions are necessary to prevent the oil from being thrown into the wrong channels, also care in design must be exercised to prevent commutator flashovers going through the bearing to the frame and causing

pitting of the journal. Barriers, insulation and the use of interpole motors are used to relieve these conditions. Then again the bearings differ in material and clearances; the Brooklyn Rapid Transit Company uses solid bronze bearings on all its cars, because of their service requirement and the disadvantages of babbitted bearings from a service delay standpoint; the Public Service Railway of New Jersey uses solid bronze bearings for all axles, but the motor armature bearings have a 1/8-in. liner of babbitt which is about 93 per cent tin. These changes were necessitated by the fact that track conditions were bad and caused hammer blows and shocks which caused the older type babbitted bearings to break and to depreciate rapidly. The liners in the motor armature bearings are necessitated by the difficulty of getting bearings to maintain an accurate fit to the motor journals. Some of the older type split-frame motor bearings must have their housings re-bored every four or five years to maintain a correct alignment. The newer box type motors and pressure fitted bearings give no trouble from lack of alignment.

WASTE AND ITS FUNCTION

The waste used in armature, axle and journal bearings serves as a reservoir for lubricant and as a capillary agent for getting lubricant to the friction surfaces.

Waste is made of long-strand wool, short-strand wool and some other material such as fiber. A typical bearing waste is 65 per cent long-strand wool, 35 per cent short-strand wool and 5 per cent fiber. The long strands in the wool waste take up oil from the oil well in the bottom of the bearing and bring it to the friction surfaces by capillary attraction. The

long strands, however, permit but little oil to flow out from their circumferences and the short strands of wool are needed to afford "ends" which readily permit oil to flow on to the friction surfaces but have little storage capacity.

When in operation, the jars and blows arising from track conditions have a tendency to compress the waste and cause it to shrink away from the friction surfaces. The fiber or other material in the waste is there to counteract this tendency by giving spring or resiliency to the packing.

When a car is in service the waste supplies a continually decreasing quantity of lubricant to the bearings, because it shrinks and glazes. Glazing results from the combined effect of frictional polishing of the waste and the action of the heated bearing on the oil and waste. Glazing destroys the capillary action of the waste and shortens its life. The better the grade of waste used and the better the quality of the lubricant the less the tendency for glazing to occur.

One grade of waste is generally used for all the bearings and its quality is determined by market prices.

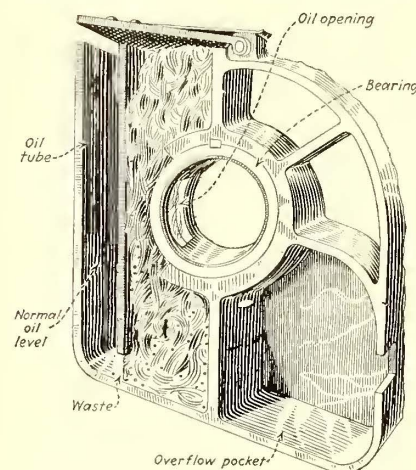


FIG. 6—SECTION OF MODERN AXLE BEARING CAP

During the war wool cost 85 cents per lb. as against 20 cents per lb. at present and, under the two price conditions, specifications for waste would differ.

Waste has a life of three or four years under ordinary service conditions. To prepare waste for use in bearings, it is picked apart and then soaked with oil for about twenty-four hours at a temperature of about 70 deg. F. The waste is drained for twenty-four to forty-eight hours and is then ready to use in a bearing. At the end of the drainage period a slight pressure of the hand should cause oil to exude and the waste should contain four or five pints of lubricant per pound of dry waste.

New waste is used in all motor armature bearings, but reclaimed waste can be used in other bearings. It is economical to schedule the waste in such a manner that it goes from motor armature bearings to driving axle bearings and then to the truck journal bearings. Between applications, the waste is always washed, picked apart, soaked and drained.

PACKING NOT STANDARDIZED

The present method of using waste as packing for motor, axle and journal bearings has some disadvantages from an operating standpoint, although it is the best method known. It involves the exercise of care and skill on the part of the oiler, yet the economics of the situation and the type of dirty work associated with the use of waste for packing result in the use of unskilled and often foreign or ignorant men as oilers and a tendency to a careless supervision on the part of the foreman and experts.

It is true that standard methods for preparing waste and for packing bearings have been developed as much as possible and the oilers have been trained to a rule of thumb standard of proficiency, but every time a bearing is packed there enters a necessity for the exercise of human intelligence and judgment inherent in the method and in its application to the equipment used in service. Bearings differ widely in packing space, end clearance, journal clearance, oil well arrangements and in dimensions and materials. Not all operating conditions or equipments are similar to those of the Capital Traction Company in Washington, which packs its journals, seals the boxes and lets them alone for about a year.

In packing the armature bearings it is the practice of some companies to press the waste firmly into the bottom of the housing, moderately tight opposite the opening in the bearing and with one large long roll of waste placed next the shaft and extending from the top to the bottom of the housing. More waste is then placed in the housing to add to the pressure and to keep the roll in contact with the shaft.

Motor axle bearings are packed solidly from the rear to the front while the truck journal bearings have a

roll of waste packed against the dust guard with loose waste under the center of the journal and another roll in the front of the housing.

The proper supervision of the packing of bearings is very important. The degree of tightness or looseness, the arrangement of waste in the housing, the design of the bearing are all elements that require the expert or the foreman to supervise.

OILING AND GREASING

After bearings are packed, the maintenance of lubrication requires that oil be supplied at intervals. Also the compressors must be oiled at intervals, the gears and pinions lubricated and the side and center bearings greased. All these parts must remain in service between inspections and the failure of a lubricant supply will result in damage and a delay in service.

Today, as never before, the lubrication of equipment is essential. Economic pressure has caused the reduction of shop forces to a minimum, has put off the purchase of new equipment and has added to the duty of the old. The shop men, due to crowding, use less care in making and fitting bearings, the tracks give the bearings harder jars and the schedules give them greater loads to carry. An example of this condition is found in the fact that one company now makes armature bearings with 0.01 to 0.012 in. clearances while formerly it used 0.006 to 0.008 in. for clearances—this in spite of better inspection and more accurate gaging. One missed oiling or greasing may result in many direct and indirect costs to the system. It may put a car out of service, cause large repair costs, destroy a schedule and irritate the public.

The oil used in armature bearings, axle bearings and journal bearings is usually of one kind. This oil is changed, however, to conform to summer and winter operating conditions. No definite dates are fixed, but the time is fixed by the weather conditions. Compressor oil is of a better grade than bearing oil, but it also is changed to conform to winter and summer service.

In some ways the seasonal change of lubricant seems unfortunate because during the changeover periods many little troubles arise with equipment and men which have their origin in the cessation of routine lubricating practice. There are, however, so many good economic and lubricating features associated with the practice that the change is warranted.

The direct cost of lubricants is a small item, but the better the quality of the lubricant the greater its cost. However, the better the quality of the lubricant the less the quantity that needs to be used. A system that changes from lubricants of one quality to those of a better quality invariably finds it difficult to get the oilers to use less of the better lubricants.

The advantages to be gained in changing to a better quality of lubricant can only be obtained by carefully training the oilers and by exercising close supervision. Too frequently lubricants are wasted—in some shops the panacea for all equipment ills is a dose of oil and repair gangs dose motors and cars at every opportunity without any reference to the scheduled routine in lubrication.

Oilers try to maintain about 2.5 to 3 in. of oil in the armature axle and journal bearing reservoirs and fill the reservoirs as scheduled by means of the oil tube and a gill measure. It is frequently the practice for the oiler to "pick" the waste also and to see that the bearings are in good condition.

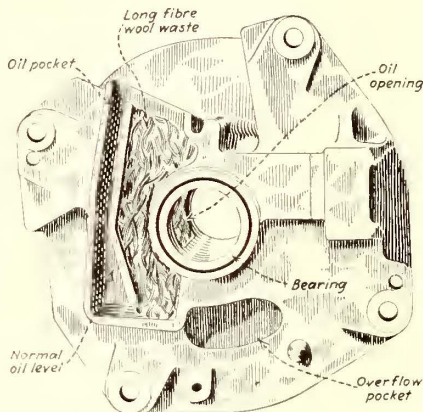


FIG. 7—MODERN SOLID FRAME ARMATURE BEARING

The lubrication of the gears and pinions requires the use of a heavy adhesive lubricant or compound. A supply of this rests in the gear case and touches the lower gear teeth. As the gears revolve the lubricant is carried around due to its adhesive qualities and functions to form a film between the contact surfaces. The chief requirement is that the compound be "sticky" and will not deteriorate in service operation. One company decreased its cost for gear compound from 69 to 49 cents per 1,000 car-miles by adding some resin to the compound and thereby improving its adhesive qualities. Gear compound is wasted by using too much in the gear case or by having loose or leaky gear cases. It is difficult to keep a tight gear case and the compound seems to find every opening.

Cup grease is used at intervals on the side and center bearings, equalizer bars, brake rigging and other slow and infrequently used contact surfaces. No particular skill is required and the only requirement is that such surfaces receive lubrication at proper intervals.

INSPECTION AND LUBRICATION

Lubrication and inspection occur on an 800-1,000-mile basis with most operating companies. At these intervals oil is added to the bearings and to the compressor and gear compound and cup grease are used if needed. Old and special equipment such as older type motors receive lubricant on a half inspection basis.

Other companies state that journal bearings should be lubricated once every thirty days if the cars make under 150 miles per day or, on a mileage basis, about every 4,500 miles. If the service is high speed, the cars making 300 to 500 miles per day, the bearings are lubricated weekly or about every 2,500 miles.

Another company cares for all lubrication by weekly inspection of all cars. The carhouse oilers add the quantities of lubricants needed. This company repacks bearings on interurban cars each three months, on semi-interurban cars each six months and on city cars each twelve months. All the work is done by daylight and the rules for repacking are subject to exceptions to suit special conditions and equipment.

Another company repacks on a car-mile basis—8,000 car-miles for motor and axle journals, 5,000 car-miles for pony axle journals. Still other systems repack at the annual overhauls unless any inspection period indicates a necessity for repacking.

One company uses about ¼ lb. of gear compound about every four weeks on each car and greases the side and center bearings, etc., with cup grease every five weeks. To save money a mixture of curve oil and kerosene is used temporarily to grease the side and center bearings when a hard rain brings about the need of lubrication at other than five-week periods.

ORGANIZATION

Organizations differ for handling lubrication. One typical method is to have an oiler to care for motor and compressor oiling and packing, another for journals and gears and a truckman to care for center and side bearings, etc.

These men are usually units in the inspection or repair gangs who have been trained by the lubricating engineer to do their jobs correctly. The foreman in each carhouse has general supervision of all work, including supervision. It does not pay to keep definite lubrication data in detail for each car in the offices, but some carhouse foremen have found it advantageous to

keep records in the carhouse. These records immediately enable them to find what motor or compressor uses too much oil and the resultant investigation may ward off serious trouble with the equipment.

In general each carhouse foreman requisitions one month's supply of lubricants on a form which shows the amount of each type on hand at the end of the month, the amount used and the amount needed for the next month. This requisition, together with mileage and cost records, enables the office force or the oil company to compile unit costs of the form indicated below.

Carhouse Location	Motor Oil	Compressor Oil	Gear Compound	Cup Grease	Total for June, 1921
54th Street	90 gal.	19 gal.	61 lb.	13 lb.	.....
Used.....	\$29 70	\$6 24	\$3 36	\$1 17	\$40 47
Cost.....	\$0 091	\$0.019	\$0.01	\$0.003	\$0.125
Mileage.....	323,340				

These unit costs serve to check each month's operation and can be studied profitably in connection with the monthly report of motor and car breakdowns. If any breakdown may have been caused by faulty lubrication a careful study can be made to determine the relation of lubrication to the trouble.

For example in May, 1921, out of 164 motor troubles on the Third Avenue Railway in New York seven breakdowns were due to worn bearings, one to a hot bearing

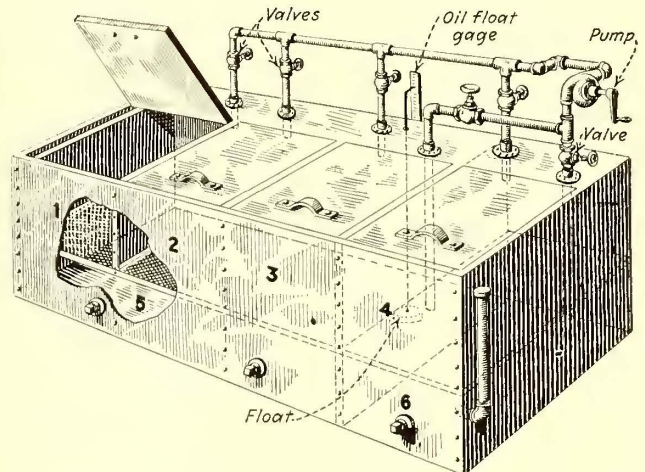


FIG. 8—WASTE SOAKING TANK

Dry waste is placed in sections 1, 2 and 3 and clean oil is pumped from section 5 to the waste sections. After soaking the oil is drained back to section 5. Sections 4 and 6 are used to re-soak old waste with reclaimed oil. Floats on tanks indicate oil levels and wire screens aid drainage.

and the large majority to grounded armatures or fields. The cause of the larger number of troubles might have been either lubrication or heat. Worn bearings might have caused armatures to drop or heat due to overloads and thus resulted in grounds. Hammer blows due to track corrugations or worn special trackwork might also have been contributory causes of trouble. Only a detailed study of the specific trouble could fix the cause, but lubrication is always a decided item in such a study. In the same month only two compressor troubles out of thirty-six could be attributed to lubrication. These two troubles were caused by leakage of oil through the housing.

CONCLUSION

Lubrication practice can never become standardized in the railway industry due to variations in equipment and service conditions and each system has its own problem of lubrication to be solved. An intelligent study of the lubrication problem on any system will

result in decreased direct repair and lubricant costs and will secure better equipment and track maintenance and enable better service to be given. No radical changes in lubrication methods or lubricants may be expected to eliminate the necessity for managerial and technical attention to lubrication.

The chief improvements in lubrication methods should be the development of a system of lubrication that does not rely so much on the skill and care of the oiler and packer for its success and changes in methods of maintaining an oil film on friction parts by which such a film is kept uniform in thickness for longer periods of time.

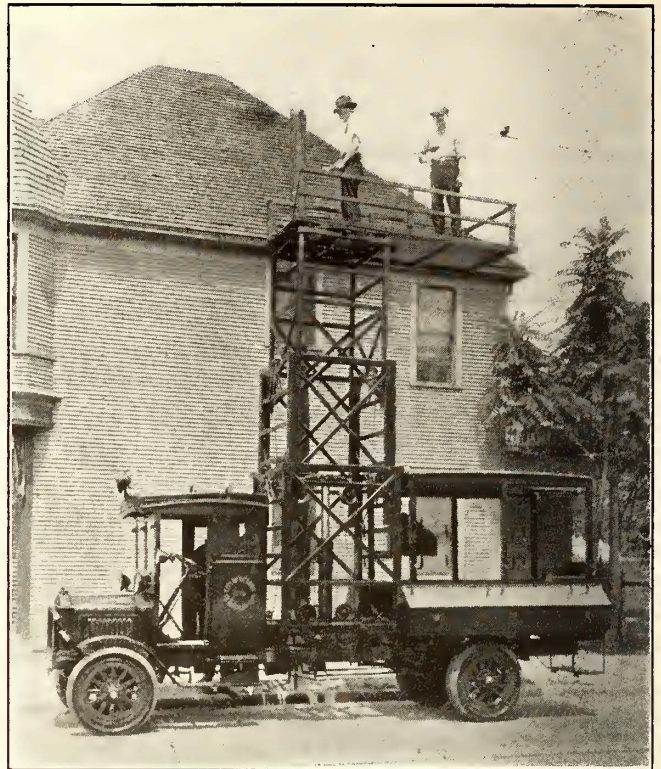
New Tower Truck for Detroit

Three-Section Tower Located Near the Center of the Body Can Be Raised or Lowered Either by Hydraulic Pressure or by Hand

ACCOMPANYING illustrations show a trolley tower truck now being used by the Municipal Street Railways Department of the city of Detroit. It was built by the Standard Motor Truck Company and is the first of this type they have constructed. A three-section Trenton tower is located near the center of the body. The tower is operated by a Wood hydraulic hoist supported on two cross members in the center of the tower. The hydraulic hoist is hooked up with a hand hoist arrangement, so that in case of emergency or when the motor is not running the tower can be raised readily by one man turning a crank. The tower lowers by gravity and the hand arrangement is fitted with a brake to control the downward speed. The operating lever for raising the tower by hydraulic pressure is located within reach of the driver's seat. The tower can be elevated or lowered in less than a minute. The total height from the ground to the tower platform is 19 ft. 6 in.; when lowered it is 10 ft. 4 in.

The front portion of the truck is taken up with an inclosed cab. This has sliding doors and is fitted with an auxiliary roof so as to allow the workman to walk on it. A ladder shaped to the contour of the cab side is attached to provide a means of getting on to the tower platform.

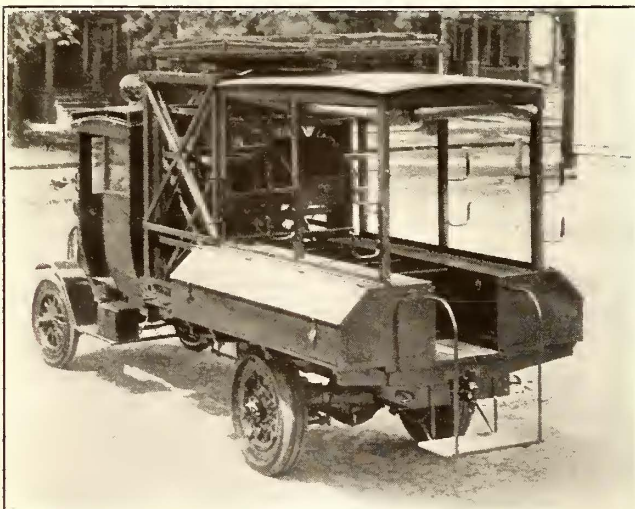
The rear portion of the body is taken up by tool boxes and bins. There are four longitudinal tool boxes, two on the inside of the body running the full length



LINE TRUCK WITH TOWER RAISED

and two outside ones. The inside tool boxes can be used as seats for workmen. The passageway between them has provisions for removable partitions so as to make four extra large compartments. The covers of the outside tool boxes are constructed on an angle so as to keep the contents dry in wet weather. A step and a hand rail at the rear end of the body make it easy for workmen to get tools and material from the inside tool boxes and compartments.

There are six double 8-in. hooks on each side of the car attached to the body posts. These are for use in hanging on coils of rope and wire. Curtains are provided at both sides and ends, so that the body can be completely inclosed in inclement weather. When not in use the curtains can be rolled up and attached to the top of the body. The chassis is equipped with a pintle hook and both front and rear tow hooks. Suitable electric lighting equipment is provided.



TOOL BOXES AND BINS ARE CONVENIENTLY LOCATED



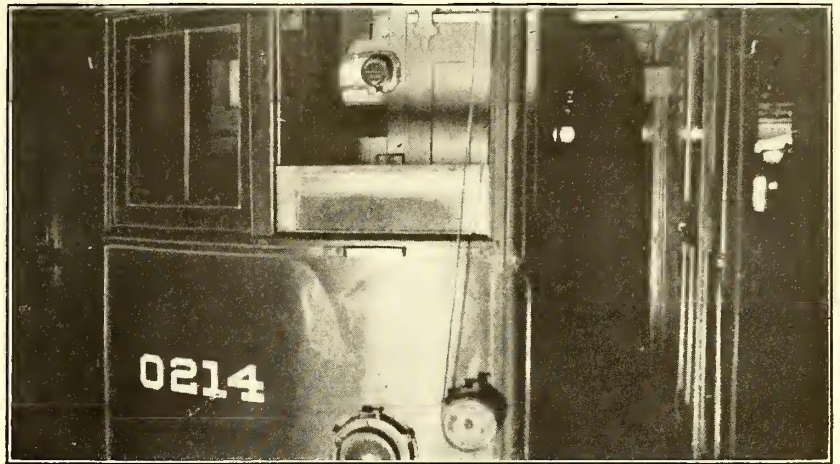
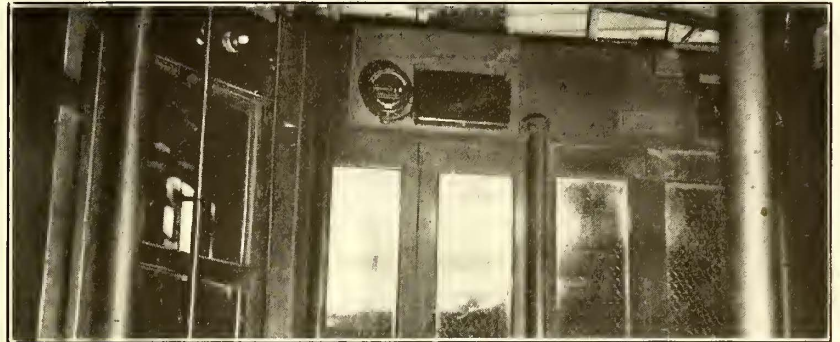
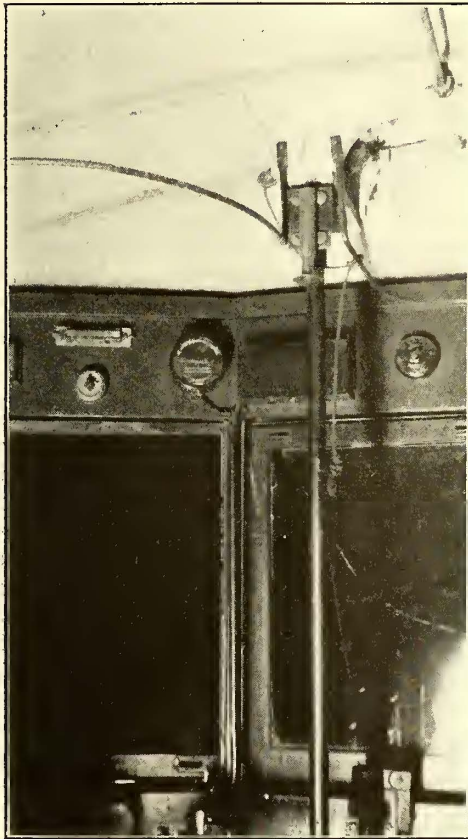
TOWER TRUCK WITH CURTAINS LOWERED

Follow-Up System for Power Saving

A Description of Methods for Obtaining and Compiling Records, Together with the Various Cards and Forms Which Are Used on the Electric Railway Systems in Springfield and Worcester, Mass.

BY C. VERNER WOOD, JR.

Supervisor of Power Saving
Worcester Consolidated Street Railway, Worcester, Mass.



INSTALLATION OF RECORDERS IN VARIOUS TYPES OF CARS

At left, recorder in vestibule of safety car. At top, recorder in vestibule of standard city type car.
At bottom, recorder in vestibule of electric freight car.

THE electric railway systems in Springfield and Worcester, Mass., have a total of 670 Arthur power-saving recorders in service at present. These have been in operation since July, 1919, in Springfield and since October, 1920, in Worcester. All freight cars of both companies have recently been equipped and records for these have been compiled since July. The type of recorder used registers the minutes of actual time that power is on.

Accompanying illustrations show various record cards and forms used for collecting information and following up the operation. The record card used by the motormen is made of a medium-grade, gloss-finished cardboard. Its size is 5 x 8 in., which is the same as the register cards used on the system. At the top of the record card is a line for the car number, and below this are spaces for entering the motorman's name, badge number, date, run number and route. Each motorman as he takes out his car enters the reading of the recorder as he finds it, and opposite this he puts down the time.

Corresponding information is entered again on the card when the motorman leaves the car. With

this system each man's record is checked with the next, and a great deal of care is given by each man to make certain that the "other fellow" doesn't make mistakes. Whenever any difference exists between the two men's readings a careful check is made to ascertain the reason. Printed on the back of this record card are a few suggestions for helping the motorman to improve his power-saving record. Sufficient space is also provided for reporting anything which may have caused the use of power unnecessarily.

CARDS ARE CHANGED EACH NIGHT

Each night the record cards are taken from the cars and new ones are substituted. In Worcester this work is done by the "register checkers" in connection with their regular work. In Springfield the work is done by spare crews using part of their time. The type of recorders used on these systems require winding and this is done twice each week. The same man does the winding that replaces the filled-out record cards with new ones.

All record cards removed are sent to the office of the power-saving department at Worcester, where they are

checked and cut up. Each man's record is filed away until the end of a period covering two weeks service, then each man's card is figured and a statement is made up showing the various records. A copy of this statement is presented to each man. Six weeks time is designated as a "prize period," and at the end of this time each man's record for the previous six weeks is figured and a prize statement is drawn up. Men are compared

tion. These daily reports are summarized every two weeks; that is, the names of the motormen who seem to disregard some of the essential requirements for efficient operation are copied off and sent to the division superintendent, who calls these men in to caution and to ask them to do better. It is found that a greater measure of success is obtained by constantly keeping "power saving" before the men and teaching them that the new manner of operation is safer and easier than the old. It is not expected that all men will be as efficient as some, but it is expected that each man will do his best. On the whole the men have entered into power saving with a great deal of spirit and the rivalry on most of the lines is quite intense.

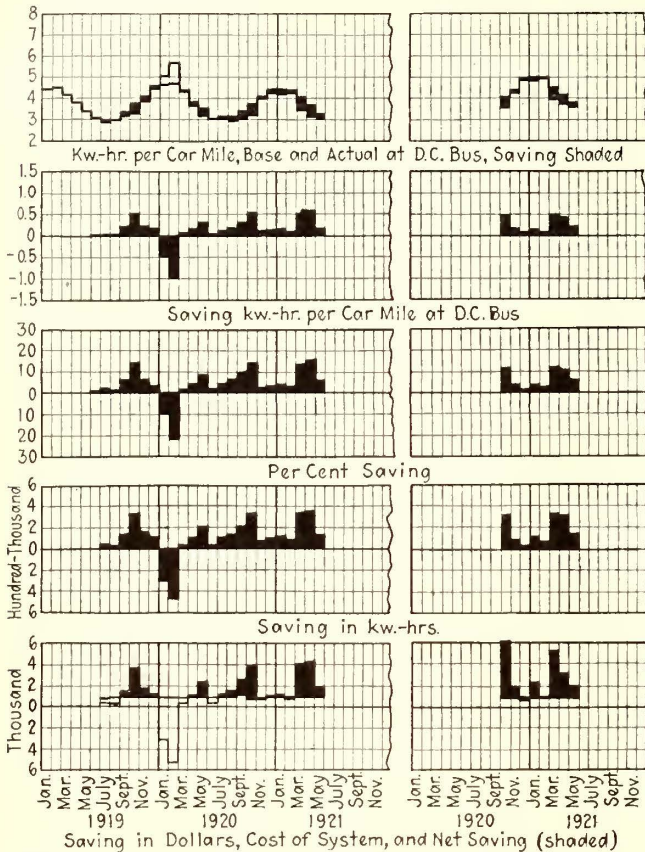
POWER-SAVING COST FURNISHED EACH MONTH

At the end of each month a statement is sent to the various offices of each company showing the cost of the power-saving department during that month. An accompanying illustration shows the form that this report takes. The costs which enter into this report include office labor, salary of power-saving inspectors, cost for office equipment, stationery used, including record cards, repair parts used for the recorders, depreciation on the recorders, interest on the investment, cost of winding the recorders and placing record cards in the cars, and the amount of prize money given out. Our cost for office labor is very reasonable as the total force required to take care of the clerical labor for both companies consists of but two clerks and a stenographer. Blue-prints of power-saving graphs of the form shown in two of the accompanying illustrations are sent out with this report. These show the kilowatt-hours per car-mile, the saving in kilowatt-hours, the per cent of saving in kilowatt-hours, the saving in dollars, the cost of the system and the net saving. These graphs are arranged to cover a period of five years by months, each month's information being added as it is worked up. This method of keeping the record enables a ready comparison to be made for each one of the important facts entering into the problem.

In figuring the saving made it is not deemed accurate to compare directly the kilowatt-hours per car-mile used from month to month with the corresponding months of the year previous to the installation of the power-saving recorders because of the fact that certain improvements have been instituted which in themselves have produced a saving in power. Also there may be a difference in the number of passengers carried and the schedule speed, which would make a difference in the amount of power consumed. Therefore, a so-called "bogey kilowatt-hour per car-mile" is put into use based on the performance dating back to June, 1918. An adjustment is made on the bogey year with allowance for conditions of the current month as regards schedule speed and average passengers carried per car-mile. Also the estimated saving of power made by the use of lightweight safety cars.

LOW MAINTENANCE FOR RECORDERS

The cost of maintaining the recorders thus far has been exceedingly low. It is planned to give each recorder of both properties a thorough overhauling once each year. All recorders on the Springfield Street Railway were gone over last fall, and will be due for another examination and cleaning this fall. The Worcester recorders will have their first overhauling this fall. It has not been found necessary to employ additional



POWER SAVING GRAPHS FOR THE WORCESTER CONSOLIDATED STREET RAILWAY AND FOR THE SPRINGFIELD STREET RAILWAY

with each other only when they operate on the same lines and under the same general conditions. The prizes given range from \$2.50 to \$1, \$2.50 being for the man with the best average record for his individual line, \$1.50 for the next best record, and \$1 for all those whose records have been as good or better than the average of the line.

WORK DONE BY POWER-SAVING INSPECTORS

A power-saving inspector is employed by each company whose duties consist of instructing the motormen as to how to operate properly and also making small repairs and adjustments as they are necessary to the recorder. The results obtained depend to a large extent on the ability of this man, as he forms the point of contact between the company and the men, and his work should be to encourage the good motormen to continue and to assist the others to try harder. This inspector also looks over the record cards each day to learn what cars are reported as poor coasters and to ascertain if all the recorders are working properly. Another form shown in the accompanying illustration is the report blank used by the power-saving inspector for recording observations as he rides on the various cars. On this form are entered the motorman ridden with, operating points noted and the number of seconds required by the motorman to feed his controller to the full parallel posi-

How the Equipment Man Can Aid in Reducing Costs

Competition Demands Lowest Possible Car Maintenance Costs, Which May Be Accomplished Through a Close Supervision of Every Detail—Suggestions Given on How Costs May Be Reduced and Interest of Shopmen Increased

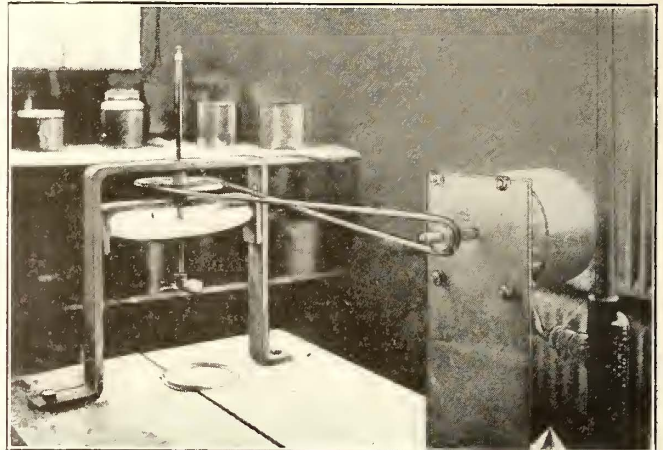
BY PIERRE V. C. SEE

Superintendent of Equipment Northern Ohio Traction & Light Company, Akron, Ohio

WHEN jitney and motor bus first appeared railway men generally thought they would not be able to compete with the street car and inter-urban. Maintenance costs, operating expenses and depreciation would soon put them out of commission. It is undoubtedly true that the electric car can be operated more cheaply than the automobile, but we find in many cities that the jitney and bus are still flourishing.

The problem brought before the electric railway by the continued reality of these competitors is to operate at a low enough cost to enable a rate of fare which will discourage if not prohibit such competition. Although the car equipment cost is a comparatively small part of the total expenses of a road, under the circumstances it is essential that car maintenance be reduced as low as possible without incurring deferred maintenance that will ultimately mean greater outlay. This is how the master mechanic can best help in merchandising car rides, assuming, of course, that he is keeping the cars in such order as to appear clean and avoid breakdown.

To obtain the minimum shop costs consistent with safe, clean and reliable service requires close following of every detail that goes into the maintenance of cars and shops. The results of a campaign in our shops to reduce the costs of car maintenance are shown in the accompanying curve, where it is seen that the average cost per car-mile was reduced from \$0.642 to \$0.475. During this period there was a 25 per cent reduction in cost of labor, but practically none in the cost of material, as the old stock bought at the high price period was still being used. This reduction in car



PAINT-MIXING MACHINE, MOTOR DRIVEN, WHICH IS A GREAT LABOR-SAVING DEVICE

followed up and only absolute necessities were drawn from the stores.

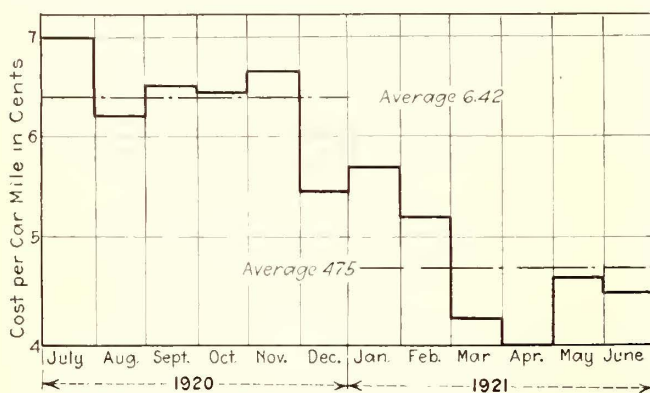
The largest single item of expense is labor. A good means of watching this item of cost is a frequent careful analysis of the shop forces so as to determine exactly the necessity for each man employed. This analysis should be compared with previous similar analyses from time to time, to determine what change in the force in each department is being made. A sample form of such a man-hour check-up sheet is shown herewith. This is made on thin drawing paper so that blueprints can be made and given to the foremen for their guidance. The last column shows each supervisor the number of men he is supposed to carry. A check against this chart can be made daily or weekly by the clerical force.

CHANCE FOR WASTE IN CAR CLEANING

The cleaning of cars is an item that may run into considerable money and, to a great extent, the cleanliness of the cars is proportionate to the money expended. On the other hand, there is probably no other class of work that has such a tendency to deteriorate and become humdrum. The best of car cleaning systems if not followed up by the supervising force soon deteriorates and the foreman, or "straw boss," feels that his work is not of importance and is only a daily routine. If he gets that attitude it quickly permeates the entire car-cleaning gang.

In order to keep these forces up to the highest degree of efficiency the car cleaning must receive frequent inspection and criticism. The testing of new materials, even though they may be no better than what is being used, has a tendency to arouse interest on the part of the men. But whatever cleaning material is used, care must be taken that the least possible damage to the varnish and enamel is involved.

Piece work or bonus systems, where they can be used, result in a very material speeding up of the



CURVE SHOWING REDUCTION IN EQUIPMENT MAINTENANCE COST DUE TO INCREASED EFFICIENCY IN AKRON SHOPS OF N. O. T. & L. CO.

maintenance cost was accomplished in spite of a considerable reduction in the mileage. In making this saving the number of men and the length of the working day were cut to the lowest possible point and all overtime was stopped. The reduction in men automatically made a corresponding reduction in the material used. The material reduction was also further

shop work, but unless the inspection of the work is very rigid the man will increase his output at the expense of the quality of his work, until it becomes necessary to limit the amount of work he is permitted to do in a day. This in turn practically nullifies the advantages of the piecework.

Lubrication and brake shoes are two items of expense that most roads are following closely in monthly statements. The reduction of the oiling to as low a point as possible is a good plan not only from the standpoint of economy but in preserving general cleanliness of the shops and roadway. In attempting to lower the oil consumption, however, it should always be borne in mind that a very few hot bearings due to lack of oil will more than offset any saving made in oil costs. So the greatest care must be taken to determine how far economizing in this direction should be carried.

The reduction of the brake-shoe cost must be followed up from several angles. The truck maintenance must be kept up so as to prevent shoes wearing crooked and running off the wheels. The inspection force may also make a big saving by the proper adjustment of brakes and by reversing shoes that are wearing heavily at one end. The changing of shoes from motor to trailer wheels may often help, while a frequent inspection of the scrap brake shoe pile and a return to the inspection shop of shoes not worn out will also have a good effect on the cost. The selection of the proper material for the brake shoes to give the greatest coefficient of friction and longest life without cutting the wheels is also necessary.

GOOD AND BAD PAINT ECONOMY

Painting is sometimes considered as being in the luxury class and in the days of gold stripes on the trucks and fancy figures on the headlinings it probably could be properly so classed. But with the modern, thin, sheet-metal sides and light pressed posts the coating of this metal with paint is an absolute neces-

sity. It is far cheaper to maintain a film of paint than to allow the metal to rust, making it necessary to scrape, sand blast and at times replace the pitted metal when the delayed painting is finally undertaken.

The question of the relative economy of flat colors and varnish, color varnish or the straight enamel system is still open to considerable discussion. The use of the varnish makes a more flexible system. If the varnished car can be brought to the shop before the varnish has perished, it can be touched up and re-varnished at a very reasonable cost. The amount of striping and lettering that is done on a car is a matter of personal taste, but it should be borne in mind that the cost of this work is high and if the money thus put out were spent in covering more cars the average appearance of the equipment would probably be better.

If ready-mixed paints are allowed to stand in the cans for any length of time the pigment usually settles out and requires considerable labor to get it properly stirred up. An electric driven propeller, shown in the accompanying picture, has been found to be a great labor saver as it will stir up the hardest paint or putty in a comparatively short time. This machine can easily be made in any shop from materials on hand.

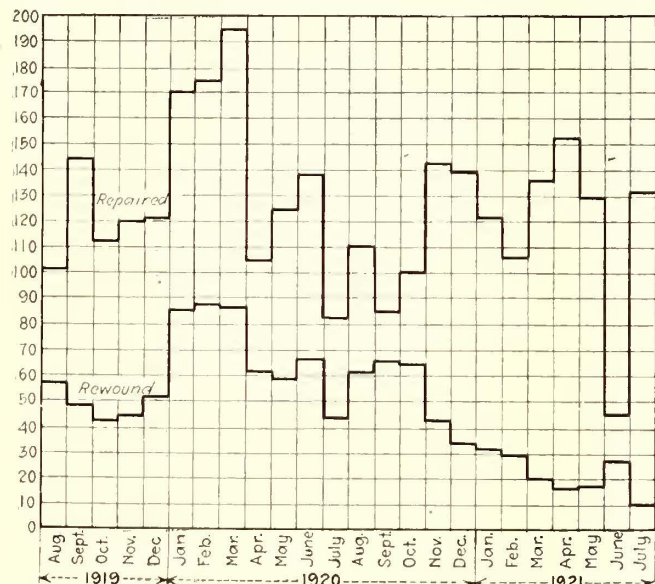
The attached curves show the number of armatures wound and repaired during the last two years. The great reduction in the number of armatures rewound was obtained by introducing a systematic oiling, which reduced the number of hot armature bearings, and by a closer checking of the motor clearance, which practically did away with bands being torn off the armatures, necessitating their rewinding. Putting into service new cars with modern motors and a lower gear ratio, the mild winter, the closing of ventilated motors during the snowy winter weather, improvement in methods of winding, insulating and baking of armatures so as to do the work in the most modern way, and a thorough cleaning up of the armature room, all contributed to this better armature record.

MAN-HOUR COMPARISON

Day Cuyahoga Falls	July, 1920		August, 1920		November, 1920		January, 1921		March, 1921	
	Number of Men	Hours	Number of Men	Hours	Number of Men	Hours	Number of Men	Hours	Number of Men	Hours
General foreman.....	1	11	1	11	1	10	1	10	1	10
Carpenters.....	3	30	3	30	3	27	3	27	3	27
Electrician.....	4	40	4	40	4	36	4	36	4	36
Truck department inspector.....	8	80	6	60	6	54	5	45	5	45
Machinist.....	1	10	1	10	1	9	1	9	1	9
Armature pit.....	2	20	1	10	1	9	..	..	..	..
Air department.....	3	30	3	30	3	27	2	18	2	18
Sprinkler inspector.....	1	10	1	10	1	9	1	9	1	9
Blacksmith.....	1	10	1	10	1	9	1	9	1	9
Boiler fireman.....	1	10	1	10	1	12	1	12	1	12
Stove repair.....	2	20	2	20	2	18	..	..	..	..
Car firemen.....	1	10	1	10	1	11	1	11	1	11
Headlight-trolley.....	1	10	1	10	1	9	1	9	1	9
Barn sweeper and yard.....	1	10	1	10	1	9	1	9	1	9
Sand and coal.....	1	10	..	..	..	..	1	9	1	9
Car cleaners.....	8	40	5	40	7	63	5	45	5	45
Cleveland inspectors.....	..	..	..	..	1	11	1	11	1	11
Cleveland car cleaners.....	..	..	..	..	2	18	2	18	2	18
Water boy.....	1	12	1	12	..	..	..	..	..	..
Club room janitor.....	1	12	1	12	..	..	..	..	..	..
Motor inspector.....	..	..	..	..	..	..	1	9	1	9
Total.....	39	355	32	315	37	341	32	296	32	296
Night Cuyahoga Falls	July, 1920		August, 1920		November, 1920		January, 1921		March, 1921	
	Number of Men	Hours	Number of Men	Hours	Number of Men	Hours	Number of Men	Hours	Number of Men	Hours
Foreman.....	1	12	1	12	1	11	1	11	1	11
Carpenter.....	1	12	1	12	1	11	1	11	1	11
Motor inspector.....	1	12	1	12	1	11	1	11	1	11
Truck and brake inspector.....	3	36	3	36	3	33	2	33	2	32
Car oilers.....	2	24	2	24	2	22	2	22	2	22
Sand and coal.....	1	12	1	12	1	11	1	11	1	11
Car fireman.....	..	..	..	..	2	22	2	22	1	11
Boiler fireman.....	..	..	..	..	1	12	1	12	1	12
Headlight repairman.....	1	12	1	12	1	11	1	11	1	11
Trolley repairman.....	1	12	1	12	1	11	1	11	1	11
Car cleaners.....	4	48	4	48	4	44	4	44	4	44
Watchman.....	1	12	1	12	1	12	1	12	1	12
Total.....	16	192	16	192	19	211	19	211	17	189
Grand total.....	55	547	48	507	56	552	51	507	49	485

The value of the acetylene cutting torch and the electric arc welder in shop work can hardly be over-estimated. A portable acetylene outfit will make a large saving by using it to cut off loose truck bolts and rivets, while the carbide generator and piping is a great help to the blacksmith and machine shops for cutting out special shapes such as brake levers and hangers.

The use of an electric welder, or "putting-on tool," as it has been aptly called, results in economies in innumerable ways. The welding of broken truck frames, armature cases, gear cases and the building up of brake levers, motor housings, armature shafts and truck parts all produce economies that may easily be figured



IMPROVEMENT IN AMOUNT OF ARMATURE WORK DUE TO BETTER OILING OF BEARINGS AND BETTER ELECTRICAL REPAIR METHODS, NEW MOTORS, ETC.

out in dollars and cents by keeping account of the labor and material and comparing them with the cost of new parts. A consulting engineer who makes a business of inspecting electric roads said that he always judged the efficiency of the shop by the condition of the scrap pile.

Standardization has been the millennial dream of the master mechanic, but only a very few roads are fortunate enough to approach this goal. An example of the result of non-standardization is found in the item of car windows. Some 200 different sizes of windows are known to exist on a single road. This requires that twenty or thirty different sizes of glass be carried in stock. If these window sizes were in even inches, so that the glass could be taken directly from the boxes without cutting, a great saving in labor and broken glass could be effected and also a much smaller amount of money need be invested in stores. This same saving would result to a greater or less extent from standardizing any car part, but where cars have been purchased at different times and in a great variety, the cost of standardizing this equipment runs into a discouraging sum of money. A careful analysis should be made, however, to see what can be done toward standardizing cars when they are rebuilt, in case of smashed ends or upon general overhauling.

It may not appear that shop and yard cleanliness has any particular bearing on the economy of maintenance, but a dirty shop means that there is considerable time lost by workmen in stepping over and around material

and in looking for tools and car parts. Whitewashed walls and ceilings will often double the amount of light in a shop and correspondingly improve the efficiency of the shop work.

Unemployment Conference Makes General Recommendation

WITHOUT attempting the impossible task of assessing the relative weight of different forces, the Conference on Unemployment now meeting at Washington under government auspices has made the following summary of the more important matters that require constructive and immediate settlement if recovery in business and permanent employment are to be speedily brought about:

1. Readjustment of railway rates to a fairer basis of the relative value of commodities, with special consideration of the rates upon primary commodities, at the same time safeguarding the financial stability of the railways.

2. Speedy completion of the tax bill with the contemplated reduction of taxes, in order that business now held back pending definite determination may proceed.

3. Definite settlement of tariff legislation in order that business may determine its future conduct and policies.

4. Settlement of the financial relationships between the government and the railways, having in mind the immediate necessity for increased maintenance and betterments, making effective increased railway employment and stimulation of general employment, in order that the railways may be prepared for enlarged business as it comes.

5. Limitation of world armament and consequent increase of tranquility and further decrease of the tax burden not only of the United States but of other countries.

6. Steps looking to the minimizing of fluctuations in exchange, because recovery from the great slump in exports (due to the economic situation in Europe) cannot make substantial progress so long as extravagant daily fluctuations continue in foreign exchange, for no merchant can determine the delivery cost of any international shipment.

7. Definite programs of action that will lead to elimination of waste and more regular employment in seasonal and intermittent industries, notably in the coal industry, in order that the drain upon capital may be lessened and the annual income of workers may be increased.

8. In the field of all the different industries and occupations the rapidity of recovery will depend greatly upon the speed of proportionate adjustment of the inequalities in deflation.

Appended to the summary is a large table of approximate index numbers based on 100 for the year 1913. The report says about these that "If the buying power of the different elements of the community is to be restored, then these elements must reach nearly a relative plane." Out of the large number of index numbers given, the following are quoted as of immediate interest to railways:

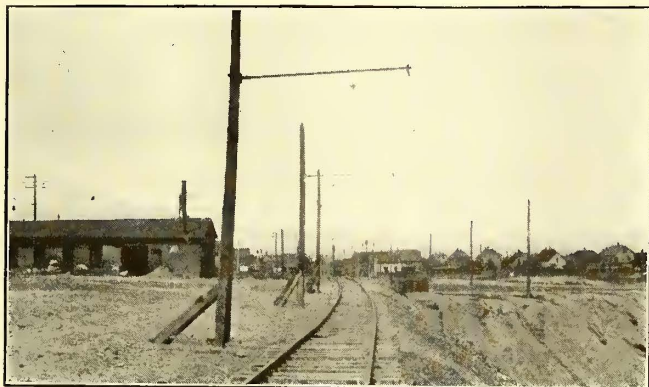
Cost of living:	
Department of Labor (May survey)	180
National Industrial Conference Board	165
Average price to producer, farm crops	109
Average price to producer, live stock	113
Average wholesale price, foods	152
Average retail price, foods	155
Construction costs: Cement buildings (Aberthaw Const. Co.)	161
Coal:	
Price, bituminous, Pittsburgh	186
Price, anthracite, New York tidewater	198
Union wage scales about	173
Non-union scale, about	136
Freight rates	187-209
Metal trades, union wage scale: Simple average, 19 occupations	218
Metals:	
Prices—	
Pig iron, foundry No. 2 Northern (Pittsburgh)	137
Pig iron, Bessemer	128
Steel billets, Bessemer (Pittsburgh)	115
Copper, ingots electrolytic, early delivery, New York	75
Lead, pig, desilvered, for early delivery, New York	100
Zinc, pig (spelter), Western, early delivery, New York	80
Day labor, scale U. S. Steel Corporation	150
Railroad, average receipts per ton-mile	177
Bureau Railway Economies estimate of railway wages based on average annual compensation, third quarter	226
General estimate all union wage scales by Prof. Wolman	189
Note—The wage indexes refer mostly to wage scales, not the earnings which necessarily also depend upon regularity of employment.	

Overhead Kinks from Cleveland

Two Schemes for Eliminating Half the Usual Number of Poles in Successful Use—Some Temporary Construction Schemes Described—A Movable Track Including Overhead for Car Unloading Dump

INGENUITY and James Scott, for many years superintendent of overhead Cleveland Railway, seem to work well together. In the issues of *ELECTRIC RAILWAY JOURNAL* for July 14 and July 21, 1917, there were presented a number of overhead construction and maintenance kinks and new ideas in overhead equipment design that had been worked out by Mr. Scott. Herewith is another grist of ideas and kinks from the same source.

When a track is under reconstruction in Cleveland,



OVERHEAD BUILT BY THE CLEVELAND RAILWAY TO BE SHIFTED WITH TRACK AT DUMP

pole, as normally set, is omitted on either side of the street. This scheme is employed purely for the purpose of reducing the first cost.

The other scheme of eliminating half the poles, roughly illustrated at B in the same drawing, is utilized to reduce construction costs and also for other reasons. It is employed at points where for some reason it is impossible to erect a pole at the proper location on one side of the street, such as is illustrated in an accompanying picture. It is also advantageously



AN INSTANCE OF OVERHEAD CONSTRUCTION USED WHERE BUILDING WAS TOO CLOSE TO CURB TO SET POLE

it is the practice to lay a temporary track on top of the pavement along one side of the street, in order to keep the cars running in both directions without the limitations of single-track operation. For the temporary trolley over this track, Mr. Scott is now using $\frac{3}{8}$ -in. standard steel span wire instead of copper wire, because it is easier to put up and take down, it remains tight and has less sag than copper, and saves cutting up the more expensive copper trolley wire.

It frequently happens that such temporary track extends close to a corner at which there is special work, including an electrically operated switch, the temporary trolley not joining the main trolley until the overhead contactor has been passed. Under these conditions it is now the practice in Cleveland to install on the temporary trolley a second contactor, which is connected up in parallel with the permanent one by simply running jumper wires over from the permanent contactor, thus keeping the electric switch operative and incurring no more delay than takes place under normal operation.

ELIMINATING HALF THE POLES

Two schemes of overhead construction which require but one-half the normal number of poles are being tried out by the Cleveland Railway, both of which seem to be proving successful. One of these, roughly illustrated in an accompanying drawing and marked A, employs diagonal span wires, zigzagging across the street from one pole to the next. The two poles on the same side of the street are spaced 180 ft. apart, with the intermediate pole on the opposite side of the street half way between. In other words, every other

employed where a new car line is to be built and it is desired to put the overhead up in advance of the track construction and as quickly and economically as possible. The scheme consists of setting poles 180 ft. apart on each side of the street, the locations on opposite sides of the street being staggered. A $\frac{3}{8}$ -in. stranded steel messenger cable is strung along each side of the street and fastened to the poles with porcelain insulators. A span wire is then erected at each pole, extending across the street and fastening to the opposite messenger by means of a porcelain spool insulator.

Where the overhead is constructed in advance of a new car line, the messengers along either side of the street are erected and one of them connected to the positive and one to the negative side of the power supply, and thus used to provide energy for operating electric shovels and other track equipment. The span wires and overhead trolley are then installed after the track has been completed. This is a particular advantage for this type of construction, for in addition to saving half the poles and lending itself to quick installation, it affords a power supply and at the same time keeps the space above the street clear of overhead obstructions.

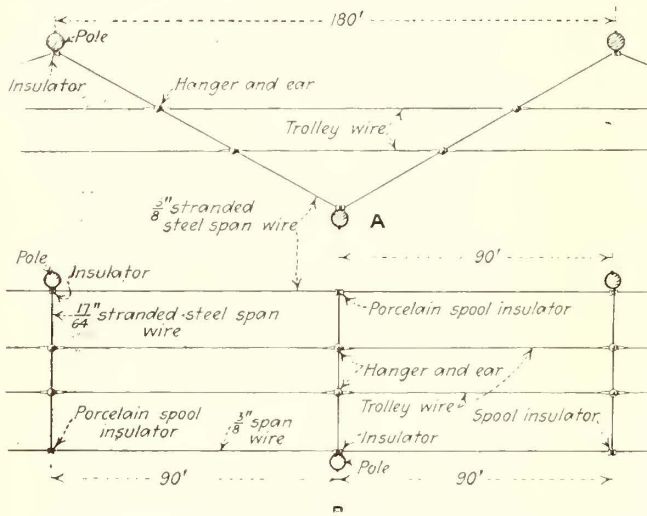
If thought necessary, the other poles opposite the ones set can later be erected without any change in the existing overhead except to extend the span wires to connect to the newly set pole, the messenger cables being then taken down. However, from the experience thus far, it appears that this type of construction using only half the usual number of poles is suitable for permanent construction.

Either of these types of overhead construction makes

a long span (180 ft.) for the feeder cable, if one parallels the line, but while this requires the use of a heavier insulator it has involved no trouble.

MOVABLE TRACK AND OVERHEAD AT DUMP

Material excavated from streets and other waste material of the Cleveland Railway is hauled in cars to a dump for filling in a great gully. The track is laid along the inside edge of the bank, and the ma-



ROUGH SKETCH OF TWO TYPES OF OVERHEAD ELIMINATING HALF THE POLES

terial is dumped directly over the edge of the bank, rolling down to a position of rest. Formerly, the overhead for this track was supported by cables strung clear across the gully. It was necessary every few weeks to move the track over to the edge of the bank as the hole was filled in, which, of course, made it necessary to slide the trolley out to the new position by moving the hangers out farther on the long cross-spans.

The overhead department got tired of this frequent shifting of trolley and so devised a scheme whereby the track department would shift the overhead along with the track. A 4-in. x 12-in. plank about 14 ft. long was placed under the rails and spiked to them at each pole location. The poles were then sawed off and placed on top of these planks and braced with 2-in. x 8-in. pieces of plank. Heavy blocks were spiked to the pole and the bottom plank to keep the butt from shifting longitudinally on the plank. Vertical timbers spiked to the plank and the pole kept it from shifting laterally. Now, as the track department shifts the track to a new location, the trolley moves right along with it. The tension in the trolley is kept uniform and tight by dead ending the wire over a snatch block on the last pole at the end of the track and hanging a couple of car wheels on the end of it, the last pole being guyed. This overhead and movable track are ten spans long.

MISCELLANEOUS PRACTICES

On the high bridges over the Cuyahoga River, on which the Cleveland Railway has four tracks, there is often a very high wind, making overhead repair work exceedingly difficult. To minimize the trouble likely to accompany a broken trolley, each pair of trolley wires is cross-connected at every span. There is also a feed-in tap at every fifth span. With this interconnection of the copper, any break in the wire causing a short circuit will anneal the wire only a very short distance, thus reducing the replacement necessary.

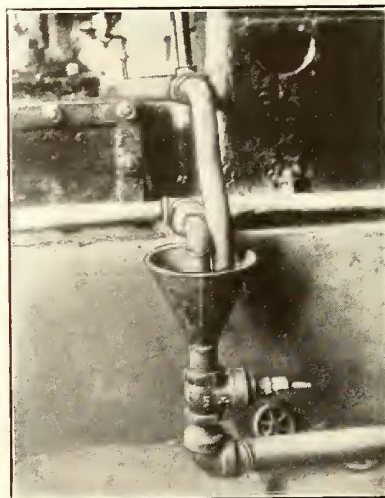
A special spring hanger for use in trolley troughs under viaducts and designed by Mr. Scott was fully described on page 110 of the July 21, 1917, issue. Some of these hangers installed under one of the viaducts have now been in service nearly five years without replacement or repair. The principal feature of this hanger is a long spring suspension, having a good deal of flexibility of movement and being quite effective in reducing flashing. Some of these ears were also used on the high bridge where the cars operate over a lower level with comparatively low overhead. Two other types of spring hangers were also tried out on this bridge.

It is planned to install 100 of these spring hangers on open overhead construction with No. 0000 wire, as an experiment. The wire always breaks at the ear because of the weight of the ear and hanger and the sharp bend that takes place at the ear as the trolley wheel approaches. The spring hanger is to be tried out to see if the flexibility thus afforded will not relieve this strain upon the trolley wire and lengthen the life by cushioning the blow of the wheel at the ear.

Concrete trolley poles are now in extensive use in Cleveland and are being used more and more all the time. According to Mr. Scott, they have proved very satisfactory and require no painting or other maintenance.

All together, fifty-two men are employed in the entire overhead department of the Cleveland Railway, which has about 410 miles of single track and operates 1,065 motor cars, 454 trailers, etc. In the work of this department, two tower trucks and four men do all of the emergency trouble work for the entire system. Five other tower trucks owned by the department are used for renewal and new construction work. Three trucks without towers are used, one exclusively for hauling the fire hose jumper, one for pole painting, and one for general hauling.

Preventing Washing in Waste Water



FUNNEL GUARD FOR PREVENTING USE OF WASTE WATER FOR WASHING

THE accompanying illustration shows a funnel type of construction arranged to carry off the circulating water from a shop compressor in the Thirty-sixth Street inspection and overhauling shop of the Brooklyn Rapid Transit Company. Previous to this installation shop men would congregate at this point a few minutes before quitting time in order to wash up in the warm water as it came

from the compressor. As this shop is provided with wash rooms and other conveniences for the shop men, this type of construction was devised with the two pipes entering the funnel, so that it is impossible to get the hands underneath the water as it flows from the pipe.

Trolley Bus Operation Commences on Staten Island

Municipally Owned and Operated Trolley Buses of the City of New York Have a Successful Trial Trip—Appropriate Speeches Heard at Sea View Hospital, the Terminus of One of the Routes

ON SATURDAY afternoon, Oct. 8, amid a noisy demonstration, assisted by the Police Band, three municipal trolley buses left Sea View Hospital for Meier's Corner and Bull's Head. This was the culmination of exercises held in the auditorium of the city hospital at Sea View at which Mayor Hylan, Grover A. Whalen and Borough President Van Name felicitated each other, told of the development of the trolley bus and urged that it was for the people's interest that the 5-cent fare be maintained. It was truly a demonstration for Mayor Hylan and his cohorts.

In speaking of what led up to the operation of the Staten Island Midland Railway trolley lines by the Department of Plant and Structures, City of New York, Borough President Van Name told how Commissioner Whalen had opened up the trolley car level of the viaduct at St. George to public vehicles after the trolley cars had ceased to operate. This permitted the buses within forty-eight hours to carry their passengers direct to the ferries and allowed them the same privilege of solicitation as the trolleys. Cheap transportation is absolutely necessary for an outlying borough like Richmond, he said, for residents must necessarily pay a fare in Manhattan, another on the ferries and a third on Staten Island. It is therefore a most serious matter to increase local trolley fares.

President Kauf of the local Chamber of Commerce, who presided at the exercises, in introducing Commissioner Whalen stated it was right to celebrate epochs, and the opening of this trolley bus line is surely an epoch in the life of Staten Island and but a forerunner of a form of transportation that will open up all parts of the island. He told how he himself had been looked upon as almost crazy when twenty-five years ago he petitioned for the right to build a passenger trolley line from St. George to Richmond and to give for 5 cents what had formerly cost passengers \$1. Many people insisted it would not pay. However, he believed in the law of transportation matters that each new form of service created its own traffic.

This new method of transportation, said Commissioner Whalen of the Department of Plant and Structures, City of New York, which will soon be put into service is a real municipal plant, conceived, designed, and constructed throughout by municipal employees. Much of the credit is due to C. T. Perry, electrical engineer of the department. Commissioner Whalen continued:

"The fundamental proposition in the installation of these trackless trolley systems on Staten Island is to provide transportation for the hitherto inaccessible vil-



THREE TROLLEY BUSES ON LOOP AT SEA VIEW HOSPITAL READY FOR TRIAL TRIP

lage of Linoleumville and to provide means of access to a great city institution, Sea View Hospital.

"We feel, however, that we are doing more than merely meeting local necessities. We feel we are introducing and demonstrating a new system of transportation that will enable Mayor Hylan to make still more certain the maintenance of the 5-cent fare and that will be of the utmost practical value to the city administration in making financially feasible the establishment of transportation lines to serve sections of the city that are now without transportation. There are vast areas, not only in Richmond but in Queens and the Bronx, that can be made available for housing only by such lines.

"Our reason for believing that the trackless trolley system is an answer to urgent needs of this city is its comparatively small cost.

"The cost for single-track trolley construction per mile varies from \$37,000 to \$60,000, according to the nature of the roadway that has to be torn up and relaid. The cost for trackless construction is approximately \$4,000 per mile. The trolley system destroys the roadway; the trackless system does not. Its wear and tear on the roadway is no more than that due to automobiles.

"We have studied out all the elements of cost, including initial investment, maintenance, depreciation and operation, and have found that the cost per car-mile of the trackless system figures less than the cost of one-man trolley operation and less than the cost of gasoline buses. The figures are as follows:

Standard safety car, per car-mile.....	24.3 cents
Gasoline bus	29.55 cents
Trackless trolley car	20.95 cents

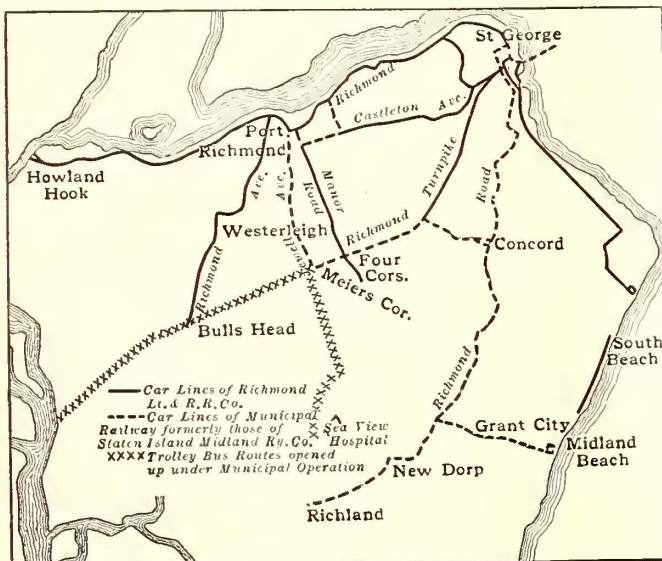
"The department believes, therefore, that in installing these trackless trolley systems on Staten Island the city is inaugurating a method of transportation that will make possible the rapid and economical development of

the outlying portions of the city and that will be found of immense practical value in enabling the city to clear its streets of the rails that now encumber them."

In his remarks Mayor Hylan reviewed largely what had taken place during his term of office. With regard to transportation matters, he contended that he had tried to render every possible transportation service to the people of New York, especially those that lived in the outlying boroughs. The closing down of the Midland line was the first attempt to force the city to grant an increased fare in New York. Motor bus operation was the result until the existing agreement covering municipal operation of the trolley cars had been made. In New York \$1,000,000 was appropriated for motor buses and if it had not been for an injunction there would probably have been hundreds of them operating at a 5-cent fare. Now the traction agents want to grab the only valuable franchise left, the bus franchise. Even the Transit Commission advocates giving away this valuable bus franchise.

The system comprises two trolley bus routes, both terminating at Meier's Corner. They are really extensions to the municipally operated trolley lines and tap territory without any other form of transportation. While the population is not extremely large, nevertheless some systematic form of transportation was becoming a necessity for the further development of the territory. The accompanying map shows not only the trolley bus routes but the rail lines operated by the Richmond Light & Railroad Company and the city of New York.

One of the trolley bus routes extends from Meier's Corner to the Sea View Hospital via Bradley Avenue and Brielle Avenue, a distance of 2.6 miles. The second line operates over the Richmond Turnpike from Meier's Corner to a settlement called Linoleumville, via Bull's Head. The length of this line is 4.4 miles.



MAP SHOWING LOCATION OF ALL TROLLEY AND TROLLEY BUS LINES ON STATEN ISLAND

The unit rate of fare on each route is 5 cents. No transfers are given between the two trolley bus routes or the municipal trolley cars. Under the plan of accounting in effect between the Midland company and the city of New York for the operation of the trolley lines it is impossible to issue or accept transfers between the two transportation systems. Nevertheless, even with the single 5-cent fare on each system of transportation

the car rider will reach his destination at a considerably lower cost than heretofore, for the taxi operators have charged almost any price up to \$1.50 to carry a passenger 2 or 3 miles.

Both of these routes follow improved paved roads. Bradley Avenue, on the Sea View line, is paved with bituminous macadam, Brielle Avenue has a concrete sub-base and asphalt top and the roads in the hospital grounds are of asphalt brick. Richmond Turnpike, which the Linoleumville route follows, has an 18-ft. concrete roadway as far as Bull's Head, a distance of 2 miles. The remainder is paved with bituminous macadam.

As for grades encountered, there are none whatever along the Richmond Turnpike, but the line to Sea View has some very steep hills. For instance, one hill alone on the outbound trip from Meier's Corner is about 1,200 ft. long and has a grade of between 10 and 11 per cent; in fact, it could be said that the line was almost a continuous climb, for the city hospital is located on one of the highest points on Staten Island. The trolley buses, however, have not so far failed to negotiate these grades, it being possible to climb them on "high."

THE OVERHEAD SYSTEM

Span construction is used throughout with 30-ft. chestnut poles, set directly in earth as was found. In some cases this was gravel or sand. Very little rock was encountered. The poles for the most part have had their butts treated by an application of creosote using the brush method. Spans using $\frac{1}{8}$ -in. galvanized iron wire were put up at a height of 20 ft. so as to support the two trolley wires 18 ft. above the street level. Where there are four wires over the street a special method of supporting them had to be used to keep the wires of each set in the same horizontal plane. The suspension consists of two span wires one above the other with a strut in the center joining them to take out the sag in the lower wire, the one supporting the trolley wires.

The feeder system consists of two 500,000 circ. mil rubber-covered aerial conductors supported on the pole pins of a 4-pin arm. These feeders extend from the power house at the city hospital along Brielle and Bradley Avenues to Richmond Turnpike, where they are tapped into the Linoleumville trolley wires.

The two trolley wires are hung on 14-in. centers. The route to Sea View has but a single pair of trolley wires strung over the center of the street, while on the Linoleumville route, due to the heavier amount of vehicular traffic to be encountered, two sets of wires, one for use in each direction of traffic, was necessary. Figure eight trolley wire of 00 size with screw clamp ears is used throughout. The trolley hanger hardware is of the type designed by the General Electric Company for double trolley work with double porcelain insulation between the trolley wires and the spans. At the ends of each of the lines loops are provided so as to eliminate the necessity of wyeing on a single set of wires. These loops all have different radii—that in the driveway of the Sea View Hospital administration building has a radius of 30 ft.; that at Meier's Corner 22 ft., while that at the terminus of the line at Linoleumville is 70 ft. in diameter. The type of construction at the hospital loop, which is typical, is shown in the accompanying illustration.

Power is furnished by a two-phase, 220-600-volt motor-generator set especially installed in the main power

house of the Sea View Hospital. The installation was made by J. L. Hemphill & Company, Inc., Hoboken, N. J. The two-phase motor is of the G.E. type and has a capacity of 400 hp. at 220 volts and 900 r.p.m. It drives a Westinghouse direct-current generator capable of delivering 250 kw. at 600 volts.

THE ROLLING STOCK

The eight trolley buses which comprise the rolling stock were built by the Atlas Truck Company, York, Pa., and follow the specifications drawn by C. T. Perry, electrical engineer, Department of Plant and Structures, city of New York.

An abstract of these specifications was printed in the ELECTRIC RAILWAY JOURNAL, May 28, 1921, page 1002. They have a seating capacity of thirty with a 24-in. center aisle, which affords ample standing room for fifteen more passengers. The electrical equipment, similar throughout to that used on

the safety cars, was furnished by the General Electric Company. Two G. E. 258 ventilated railway motors furnish the propulsion force and are mounted in tandem amidships and arranged for series parallel control. Power is transmitted by a Sheldon worm drive to the driving wheels. The car can easily maintain a speed of from 20 to 25 m.p.h. on a level road. A hand-operated controller, type K-63 F, interlocked with a foot pedal safety device or dead man control, is located at the left of the driver, where it can be easily operated by his left hand. The first contact point for operation is obtained by a movement of the foot pedal and acceleration is had by a hand movement. The service foot brake as well as the hand emergency brake lever are located in front of and directly to the right of the driver's seat. At the immediate right is the lever for opening and closing the service door.

The interior finish of the bus body is white enamel, with the exception of the Hale & Kilburn seat frames, which are battleship gray. The window sashes and sills are natural finish. Seat coverings are Spanish leather.

As will be noticed, the collector is of the type first used on the trolley bus designed for Richmond and described in the ELECTRIC RAILWAY JOURNAL, June 25, 1921, page 1160. The hickory pole is supported on a ball-bearing base which allows free play to the pole so that the car can swing 9 ft. 6 in. off the center line of the wires without dewiring. At the base of the trolley pole and inside the body is a hand maneuvering device by which the operator can raise or lower the pole or swing it from side to side to meet the varied operating requirements without leaving the car. Springs in the trolley base furnish sufficient tension to insure suitable contact

pressure between the pole head and trolley wires. A different and lighter type of collector is to be tried out in the immediate future.

Illumination is furnished by two five-light circuits from the trolley circuit. In addition there are emergency lights, two at the rear, one each over the step and the driver's seat. These are operated from a six-cell Prestolite battery, which is charged from a generator mounted on the forward end of the armature shaft. A low potential relay cuts into the circuit the emergency lights in case the trolley pole leaves the wire. The battery also furnishes power for the type S-74 Golden Glow headlights, the tail-lights and steplights.

United States solid rubber tires on American Cushion wheels are used throughout. On the rear wheels are mounted 36 x 8 rib tread solid tires and on the front wheels 36 x 6 "Highsize" single solid tires are used.

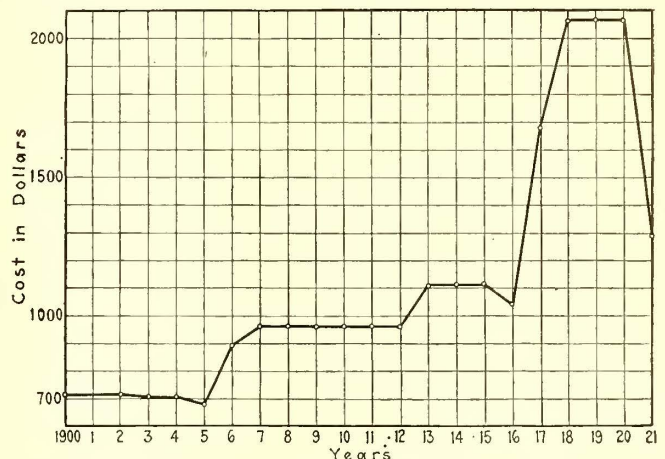
Consolidated Car Company Type A heaters are used. One is located under each of the six cross seats, two on each end of the seat across the rear end of the body and two mounted on the inside of the front dash.

Special Trackwork Prices

THE accompanying graph shows the cost of a double track 90 deg. crossing for any year from 1900 to 1921. Based on this chart, the tabulation for special trackwork costs shown in the accompanying table was worked out. This shows the present variation in price for each year, taking the price of 1900 as a base.

PER CENT VARIATION OF SPECIAL TRACKWORK COST FROM BASE PRICE AS OF YEAR 1900

Year	Increase, per Cent	Decrease, per Cent	Year	Increase, per Cent	Decrease, per Cent
1900	...	..	1911	33½	..
1901	...	..	1912	33½	..
1902	...	..	1913	54	..
1903	...	2	1914	54	..
1904	...	2	1915	54	..
1905	...	5½	1916	44½	..
1906	23½	..	1917	132½	..
1907	33½	..	1918	186	..
1908	33½	..	1919	186	..
1909	33½	..	1920	186	..
1910	33½	..	1921	80	..



COST OF DOUBLE TRACK CROSSING—90-DEGREE STANDARD GIRDER HARD CENTER CONSTRUCTION

This chart and tabulation may form the basis for other calculations. Thus, if it is desired to construct a graph for a certain layout or piece of special trackwork, all that is necessary is to know the price paid in a certain year, and use the table. Thus, if a company paid \$300 for a tongue switch in 1919, and it is desired to know the price paid in 1914, then by the use of the table the price would be $\frac{300}{286} \times 154 = \161 .

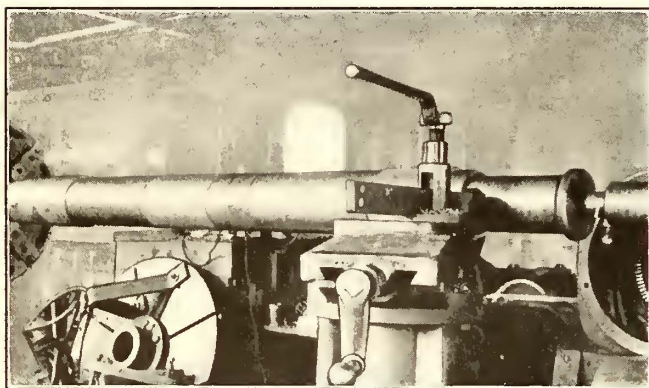
Equipment and Its Maintenance

*Short Descriptions and Details of New Apparatus of Interest
to the Industry. Mechanical and Electrical
Practices of All Departments*

Shop Notes from Michigan City

**Hot Boxes Are Eliminated by Rolling New Journals—This
Had Formerly Been a Common Cause of Trouble—
Simple Tension Machine Facilitates
Armature Banding**

THE DIFFICULTY with hot bearings, which has been common with the very heavy single-phase cars on the Chicago, Lake Shore and South Bend Railway whenever a new axle was installed, has apparently been completely eliminated by a simple process of rolling the journals. Formerly, the bearing surfaces of the axle were smoothed up to an apparently even surface by filing and the use of oil and emery paper. It was a common experience, however, to have to change the babbitted



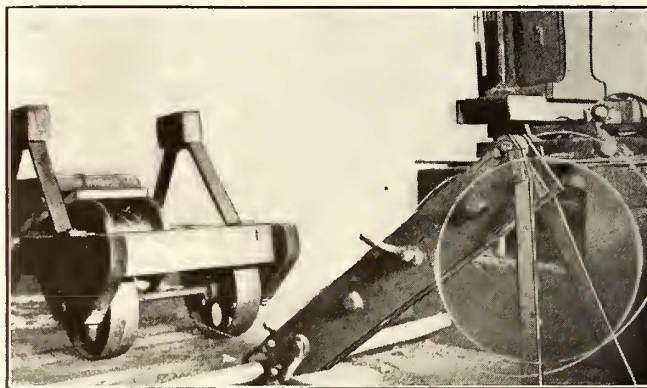
THE ROLLED AND UNROLLED PORTIONS OF THE AXLE SURFACE CAN BE SEEN AT THE LEFT OF THE TOOL

shell-type bearings two or three times before the surfaces became worn so that the bearings would not run hot.

The scheme now followed is to run a case-hardened steel roller over the bearing surfaces. After the last finishing cut on the axles is taken, the roller is substituted in the lathe tool post for the cutting tool and forced up against the bearing surface of the axle by means of the cross-feed screw, as much as can be done by hand. The lathe is then started and the roller run back and forth once over the surface, using the regular lathe feed. The roller is about 2½ in. in diameter with a flat face ¾ in. wide and having the edges rounded off. In passing over the surface of the axle, this roller seems to compress the metal ridges left by the cutting tool, leaving a smooth and polished surface. No further smoothing of any kind is done. Of forty-six new axles started off after finishing in this way, no hot boxes have occurred.

M. M. Lloyd, master mechanic, who originated this practice at the Michigan City shop of this high-speed single-phase line, states that the idea is not original with him but is one followed by many steam road shops. The motor axle bearings are rolled in the same manner and also the armature bearings.

Having had unsatisfactory results from various tension machines for use in banding armatures, Mr. Lloyd had the machine built which is pictured herewith. It has worked out very satisfactorily in providing uniform tension of whatever amount desired. This machine consists of four grooved-steel pulleys, 3 in. in diameter, supported on ¾-in. posts between two pieces of ½-in. x 4-in. x 30-in. steel bars. The pulleys are turned with a shoulder on each side and leather washers are inserted between the pulley and side frame. On one end of each bolt is a lever type nut, with which the tension on the banding wire may be adjusted by loosening or tightening the nut. Two of these levers are on one side of the frame and the other two on the opposite side, and approximately equal tension is set up on each.



HOME-MADE TENSION MACHINE WHICH HAS IMPROVED THE ARMATURE BANDING WORK

At each end of the supporting frame a small steel block is provided with a hole through which the wire is fed. The back end of the frame is hooked over a pipe which is strapped to the floor, while the end of the frame nearest the lathe on which the armature is mounted is supported on a triangular shaped leg. The rear connection holds the machine at a fixed distance from the lathe but makes it possible to shift the machine laterally so that it will line up with the proper position of the banding on the armature. The triangle support at the rear end makes it possible to adjust the height of the tension block so that the wire pulls approximately straight out of the block to the armature. This triangle is 14 in. high when standing vertically. The whole machine is mounted on the floor behind the lathe.

TAKING UP END PLAY IN ARMATURE BEARINGS

End play in armature bearings on the South Shore Line is kept to a minimum by the use of galvanized iron or heavy tin stampings which are slipped over the brass up against the collar to take up the wear on the inside end of the bearing shoulder. These stampings are very cheap and come in various thicknesses, and sometimes two or three of them are inserted. This scheme is used only with bearings having a keyway.

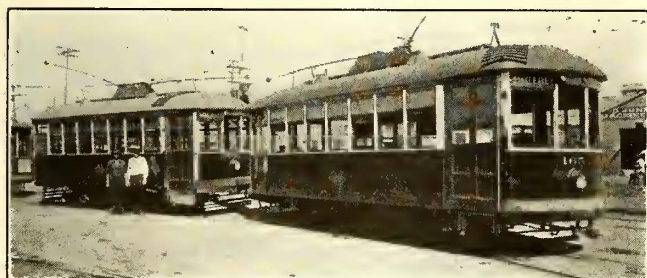
More than a year ago one of the Davis steel wheels used to a certain extent by this company chipped out on the tread, leaving a hole which acted much like a slid flat. As an experiment, the hole was filled up with an acetylene welder, and while the metal was still hot it was hammered out as near to the proper contour of the tread as possible. A wheel-truing brakeshoe was then used on this wheel for one trip, and thereafter the car continued in normal service. Fourteen months later this wheel came in with another spot chipped out and inspection at that time showed that the former weld could be scarcely found. As nearly as could be ascertained, the welding had not injured the metal at all, so the new spot was filled in in the same manner and the wheel put back in service.

TELEPHONE SIGNAL SYSTEM

An effective signal system for calling the master mechanic or shop foreman to the telephone from any part of the shop is in use in the Michigan City shop. A whistle connected with the shop air supply is fitted with a magnet for opening the valve and electrically connected to the dispatcher's office. The dispatcher presses a button once or twice, giving one or two short blasts of the whistle to signal whoever is wanted to the telephone.

Safety Cars Built by Texas Railway

THE Texas Electric Railway has just completed and placed in service eight single-truck safety cars of a type illustrated herewith. These cars were built in the company's shop and cost complete \$3,600 each.



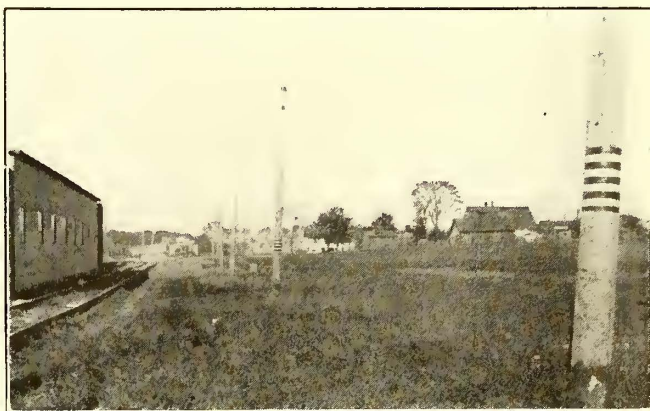
NEW SAFETY CARS OF THE TEXAS ELECTRIC RAILWAY

They are operated on the same schedule and same lines as the "Birney" safety cars owned by the company. Second-hand trucks were purchased and remodeled for use with air brakes.

These cars have wooden underframes and posts with steel dashers and sides. The bumpers are of angle iron and angle reinforcements are used for platform knees. The underframe, posts, plates, belt rail and interior finish are long-leaf yellow pine. The roof carlins, sash and doors are straight-grained white oak. Native woods were used in the construction of these cars as previous experience had shown that they are less subject to decay than imported material. The cars are 27 ft. 10½ in. over bumpers, 17 ft. 8 in. over body, 8 ft. 1½ in. wide over belt rail and weigh 16,800 lb. equipped. Some of the equipment used consists of Brill 21-E trucks, CP-25-C air compressors, International R-5 registers, Johnson fare boxes, "Golden Glow" SM-95 headlights, Consolidated 92-T heaters, "Keystone" destination signs, Heywood Brothers & Wakefield seats, Crewsome pneumatic gongs, US-15-B trolley bases, K-63-B controllers, GE-81-A and 201-G motors, curtains, "Fabrokoid," and air brake and safety control, Safety Car Devices Co.

Poles Painted to Indicate Positive Stops

POSITIVE stops for the cars of the Detroit municipal system are to be indicated and the motormen forewarned by a system of painting the poles adjacent to the stop. On the fourth pole from the stop appear four white stripes painted with aluminum paint on a black background. The next pole has three such stripes, the next two and the last pole before the stop one. Because of the nature of the paint these markings show



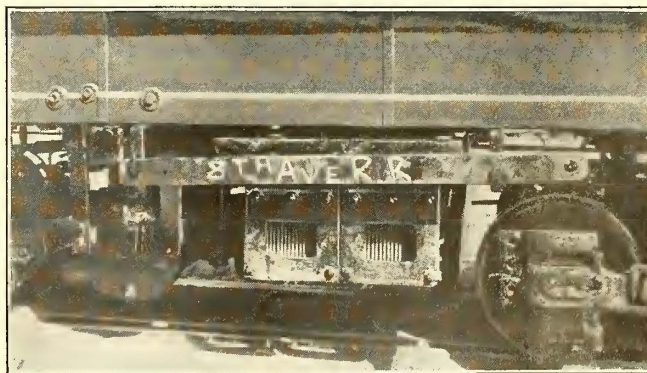
SCHEME OF PAINTING POLES TO FOREWARN MOTORMEN OF POSITIVE STOPS

up from the headlight and street lights very well at night.

Having these warning signs, there is no excuse for a motorman not having ample time to make the stop or knowing when he is approaching a stop and how far from it he is. The idea originated with the Connecticut Company, where it is extensively used on the interurban lines. It is to be adopted for the Detroit city system.

Marking Drawbars to Prevent Theft

THE Eighth Avenue Railroad, New York City, experienced considerable difficulty from the theft of drawbars from its cars. C. P. Westlake, supervisor of equipment, evolved the scheme of lettering these by the addition of metal through electric welding. This

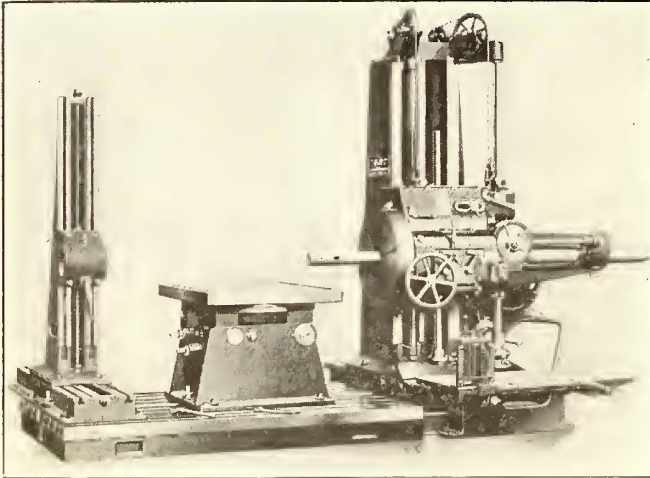


DRAWBAR LETTERED WITH ELECTRIC WELDING

method has proved very satisfactory and has effectively remedied the trouble. The lettering can be added in a very short time, and as the metal burns into the surface of the drawbar there is no effective means of removing it from the car. The halftone view shown above illustrates one of these drawbars as lettered installed on the side of a car.

Boring, Drilling and Milling Machine

A NEW line of horizontal boring, drilling and milling machines has been developed by the Pawling & Harnischfeger Company, Milwaukee, Wis., of which the 4-F machine shown in the accompanying illustration is the smallest size. This machine is especially designed for very heavy milling and large boring operations. Some of the special features are: All feed screws in tension; all sliding parts with take-up for wear; saddle fully



HORIZONTAL BORING, DRILLING AND MILLING MACHINE

counterbalanced with counter-weight located inside of the column; centralized control; all milling feeds actuated through quick pitch worm and bronze worm wheels, revolving on quick pitch screws in tension; interchangeable; externally and internally driven face plates; back gears close to spindle, making all drive shafts high speed; automatic stops for saddle and column for machines electrically driven.

New Metropolitan Electric Locomotive

THE Metropolitan Railway of London has under course of reconstruction twenty of its existing electric locomotives. High-capacity electrical apparatus is being installed and arranged on supports in a central position down the cab of the locomotive, ending in a main switchboard at each end and surrounded by a hand rail which leaves ample space on either side for cleaning and inspection of the equipment.

The control is the automatic multiple-unit electric type, with sufficient steps on the master controller to allow of easy switching. Below the electric equipment in the cab are situated two motor-driven vacuum pumps and one air compressor, together with their respective reservoirs.

The company's standard arrangement of brake-tripping device is being considered with an improved electrical interlocking arrangement as a safeguard by means of which it is impossible for a driver to set his locomotive in motion without first having the brake apparatus ready for immediate application.

To enable the driver always to have a clear view in wet weather an automatic window wiper is being installed, operated from inside the cab. Either the vacuum or the air brake apparatus is available for use according to the class of work.

In order to give more even haulage and acceleration the locomotive takes current from the main power positive and negative bus lines coupled up electrically with the passenger rolling stock. These through-train

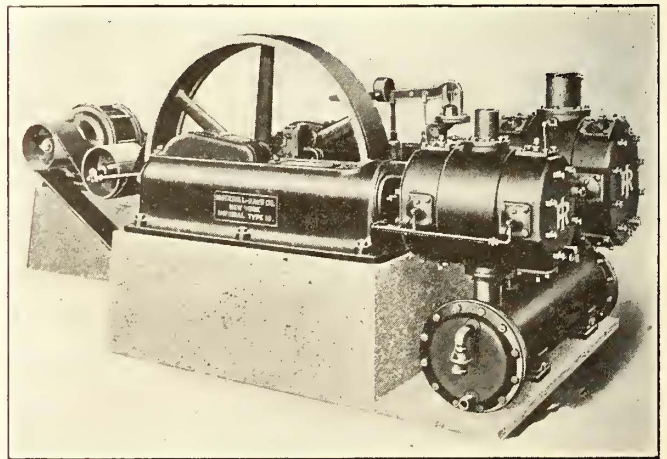
lines connect with collector shoes on the first and last coaches. This provision enables the locomotive to collect the current when the collector shoes on the locomotive itself are bridging gaps in the conductor rail.

There are four motors mounted on the two trucks, each of 300 hp. capacity. The motor is carried on the axle by means of suspension bearings and a portion of the weight is transmitted by means of a nose on the motor castings which rests in a yoke sliding vertically up and down in guides fixed to the truck transom. A slight elastic support is obtained by means of rubber cushions. The running wheels are of the disk center type, having the brake shoes acting on both sides of the wheels. All pin joints in the brake gear are bushed with renewable bushings and case-hardened pins. The truck frames are of solid construction and consist of plate frames well stiffened with cast steel corner castings. Advantage has been taken of the latter for supporting the brake beams and levers. Side louvres are provided in addition to roof ventilators.

New Belt-Driven Air Compressors

THE Ingersoll-Rand Company, New York, has announced a new line of belt-driven air compressors, known as the "Imperial" Type "XCB." Features of construction include plate valves, for both the air intake and discharge, and five-step clearance control for regulating the compressor's output.

The plate valves used in this type of compressor are the result of a complete analysis of the light-weight plate type of valve. They include features which have been found necessary to the functioning of this type of valve, the most important of these being that the



BELT-DRIVEN AIR COMPRESSOR

valve is supported throughout its entire operation in perfect alignment without any form of wearing guide.

With the clearance control the compressor is automatically loaded or unloaded in five successive steps, these steps being obtained by the reduction or addition of clearance space to the air cylinders. The compressor will operate at full, three-quarter, one-half, one-fourth and no loads.

In the four cities clustered together on the east side of San Francisco Bay 3,353 residential building permits were issued during the eighteen months ended June 30, 1921, notes the *Engineering News-Record*, and of these 85 per cent were within three blocks of street car lines. The estimated cost of this 85 per cent was \$15,030,412, as against \$1,433,355 for the remainder.

Accountants' Association Proceedings

Three-Day Session Covers Wide Range—Discussion Centered Around Electric Railway Cost Accounting for Both Operating and Capital Accounting—The Question of a Standard Material Classification for Storeroom Records Also Brought Up

THE opening session of the twenty-fifth annual convention of the American Electric Railway Accountants' Association convened at the Chalfonte Hotel, on Monday, October 3, and at 2:50 p.m. F. E. Webster, first vice-president and acting president of the association, called the meeting to order.

The rather novel idea of each delegate introducing himself and his company affiliation gave the meeting a touch of friendliness not often found at convention meetings. Following this, Vice-President Webster addressed the convention. An abstract of his remarks follows:

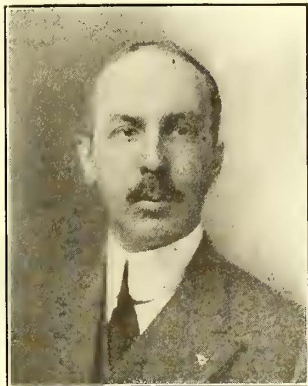
ADDRESS OF MR WEBSTER

"It was with a feeling of deep regret that we learned of the passing of our president, John J. Landers, on Friday, Sept. 9, 1921. Mr. Landers was elected an officer at the 1916 convention, and has always manifested a keen interest in making a success of our meetings. Aside from the loss of a friend and associate the association will miss his wise counsel and his unselfish interest in matters affecting the welfare of our organization. A special committee on resolutions will be appointed, which will report at this meeting.

"The street railway industry has not, as yet, emerged from the severe shaking which it received during the period of depression and the intrusion of many factors which operated to unsettle the foundations upon which a railway is built—the rendering of service to the public. Business depression has caused a curtailment in many lines of industry, producing an immediate cessation in travel, which is quickly reflected in gross revenues. Jitney service and bus transportation have also appeared as disturbing factors. The accountants have aided materially in the solution of their company's troubles by having available, or have taken prompt steps to establish them, such facts and data as were needed as a guide in the adoption of such ways and means as were necessary to formulate plans whereby corrective measures could be established.

"The burdens experienced in the process of readjustment have not been of our own choice, but I believe such a crisis is not without its compensations in that we now realize the inestimable value of the data furnished by the accountants and their departments. The advantage of following a standard classification of accounts has proved its value, and our records of operations have mapped the courses that our systems should follow.

"In this connection there is presented



F. E. WEBSTER

Vice-president and treasurer Massachusetts Northeastern Street Railway, vice-president Accountants' Association 1920-21, presiding officer Accountants' Convention 1921, president Accountants' Association 1921-22.

a situation to which our organization should give serious thought. Committee assignments are made and to these committees important matters are referred for consideration and report. To those appointed on committees a duty is attached, and such duty is quite often rendered at a real sacrifice, but the importance of it is found in their results which become accepted as standards as they reflect the judgment of experts and authorities. I believe, also, that the members in attendance at the annual conventions should freely enter into a discussion of the papers that are presented in order that there may be such an expression of ideas that the maximum benefit will be received.

"Regulation by public authorities has been prescribed by practically every state in the Union, and uniformity in practices will go far toward co-operation which is so essential. The annual convention of the National Association of Railway Utilities Commissioners will be held at Atlanta, Ga., Oct. 11 to 14, and the president of that association has been generous in his invitation to utility organizations to be represented. In such collective action a common benefit is a certainty.

"Following the 1920 Convention the Transportation & Traffic Association did not reappoint the joint committee on Collection and Registration of Fares which has been functioning for the past two years. In due course the accounting members of this committee resigned and it is now suggested that your Executive Committee discontinue that committee.

"The general plan of co-operation between affiliated associations of the American Electric Railway Association is a highly desirable feature, and there is one of our committees to which I direct your attention. For several years the joint committee on engineering accounting was active but with the advent of the war this committee was apparently abolished. I suggest that consideration be given during the present convention to a revival of the activities of this committee.

"It is interesting to review the various subjects of papers presented at former conventions, which are printed in the proceedings. This year's subjects are timely as well and carry out the high plane of previous years.

"An extract from an editorial in a recent issue of the ELECTRIC RAILWAY JOURNAL emphasizes a certain obligation:

If there was ever a time in the history of the American Electric Railway Association when intimate counsel and discussion was necessary and valuable it is at present. . . . The industry today is on the mend. But this fact does not remove the other fact that it is still in a critical condition and needs and deserves the leadership which can develop and grow as a result of constructive discussion of its problems.

"The selection of the subjects for this year's meetings, and the presentation of them by their authors is the result of a great deal of work on the part of the program committee, and I trust that due appreciation will be shown by real discussion following each paper.

"In taking up the work of the convention, which I trust will be of interest to us all, we should not lose sight of the fact that we owe a duty to the companies which we represent. This can be fulfilled only by a faithful attendance at all of the meetings. My wish, is that you all enter into the spirit of making this a real meeting and take an active and enthusiastic part in the discussions."

REPORTS OF EXECUTIVE COMMITTEE AND SECRETARY-TREASURER

The report of the executive committee, covering its activities in detail for the year, was read by Secretary F. J. Davis. He also presented his own report as Secretary-Treasurer, which showed there were fifty-two individual members and 105 company section members allied with the association. Expenses incurred for the eleven months ending Sept. 30, 1921, totaled \$873.54, divided as between the cost of printing the papers and proceedings \$750.34 and mid-year meeting expenses of \$123.24.

Following the reading of these reports acting President Webster appointed, in accordance with executive

committee action, a special committee to draft resolutions on the death of President John J. Landers, consisting of I. A. May, chairman; F. J. Davis and C. W. Stocks. The personnel of the regular convention committee in resolution was also announced as M. R. Boylan, chairman; J. S. Pardoe, and E. M. White. The chair also announced the personnel of the committee on nominations as follows: M. W. Glover, chairman; A. M. Curtis, W. E. Jones, H. L. Sanders, and W. K. Zinsmeister.

The report of the committee on standard classification of accounts was presented by Secretary Davis. An abstract of this report follows:

STANDARD CLASSIFICATION OF ACCOUNTS

During the year the committee has been called upon to give more than the average number of decisions to questions submitted to them, most of which have come through Director Wylie of the Bureau of Accounts of the Interstate Commerce Commission.

On May 20, 1921, Mr. Wylie released for publication in *Aera* and the *ELECTRIC RAILWAY JOURNAL* answers to seventy-eight questions that had been submitted and passed upon by his department and your committee. They were released with the understanding that these answers had not had the formal approval of the Commission and were therefore subject to such revision as might be thought proper before final publication in an accounting bulletin.

Under date of Nov. 17, 1920, the notice was received advising of the amendment to Section 20 of the interstate commerce act under date of Feb. 28, 1920. The section as amended provides that,

The commission shall, as soon as practicable, prescribe, for carrier subject to this Act, the classes of property for which depreciation charges may properly be included under operating expenses, and the percentages of depreciation which shall be charged with respect to each of such classes of property, classifying the carriers as it may deem proper for this purpose. The Commission may, when it deems necessary, modify the classes and percentages so prescribed. The carrier subject to this Act shall not charge to operating expenses any depreciation charges on classes of property other than those prescribed by the commission, or charge with respect to any class of property a percentage of depreciation other than that prescribed therefore by the commission. No such carrier shall in any case include in any form under its operating or other expenses any depreciation or other charge or expenditure included elsewhere as a depreciation charge or otherwise under its operating or other expenses.

The notice also stated that for the purpose of carrying out these requirements the commission has created a depreciation section of the Bureau of Accounts in charge of Frank S. Fowler. The duties of this section will be devoted exclusively to the consideration of matters pertaining to depreciation covered by the amendment and it will, as quickly as possible, proceed to call upon the carriers for such information as it may require to aid the Commission in determining the classes of property subject to depreciation and in fixing just and reasonable percentages of depreciation to be applied thereto.

This notice was promptly acknowledged and your committee stated that it stood ready to confer or assist Mr. Fowler in any way.

Realizing the importance of this subject the committee called it to the attention of President Gadsden and after consideration by the Executive Committee of the American Electric Railway Association the committee was made a special committee of that association to handle matters in connection with the Depreciation Section of the Interstate Commerce Commission.

The committee immediately took up the subject and held a meeting in New York on Feb. 25, 1921. This meeting was attended by Lewis Lillie, vice-president of the United Gas Improvement Company, representing a joint committee which was considering the same subject in the interest of several industries that also come under the control of the Interstate Commerce Commission.

It was the opinion of the committee that the question so far as it related to electric railways, could not with advantage be linked up with its application to other public service companies.

On March 8 the committee met in New York with Mr. Fowler to determine the procedure to be followed in submitting the views of the electric railways. It was decided to submit, as soon as practicable, a brief embodying its views.

Accordingly the committee under date of March 18, 1921, submitted to Mr. Fowler a brief covering each of the following subjects: Original construction good or poor, physical decay, use, wear and tear, climatic and soil conditions, maintenance and deferred maintenance, age, inadequacy, obsolescence, franchise regulations, the human element, public demand, financial condition, and size of property. The brief concluded with the statement: "We are strongly of the opinion that . . . each electric railway company should be permitted to work out from its own experience such charges for depreciation as its own experience determines to be reasonable and proper, such rates to be subject to review and any manifest errors or irregularities to be corrected."

It is the understanding of the committee that before any rules are finally promulgated by the Interstate Commerce Commission, that those interested will have an opportunity to be heard if they so desire.

The report was signed by H. L. Wilson, chairman; William F. Ham, William H. Forse, Jr., R. N. Wallis, and P. S. Young, as members.

REPRESENTATIVES AT COMMISSIONERS' CONVENTION

The report of the delegates representing the association at the 1920 meeting of the National Association of Railway & Utilities Commissioners was likewise read by Secretary Davis. The committee stated that the reports presented at that meeting covered a number of subjects vital to all public

utilities and that the report of the committee on statistics and accounts at that meeting dealt entirely with gas and electric accounting systems. The committee, however, has during the past year taken up the matter of a standard form of annual report required of electric railway companies, by public authorities. Of the forty-seven State commissions addressed, New Mexico failed to report; two (Iowa and Mississippi) reported no jurisdiction; twenty-nine reported the adoption of the Interstate Commerce Commission form of report; three (Montana, Nebraska and North Carolina) reported a more simplified form of report; five (Illinois, Wisconsin, New Jersey, New York First and Second Districts) have adopted forms requiring utilities to report more data than is demanded by the Interstate Commerce Commission form, while eight do not require the filing of a financial report. Of the latter, the Commissions of Louisiana, Minnesota and Tennessee expect to prescribe a form of report in the near future, and this committee is endeavoring to have them adopt the Interstate Commerce Commission standard. The State of Delaware does not have a public utility commission. The Railroad Commission of the State of Arkansas has no jurisdiction over street railway companies operating within incorporated limits and therefore requires no annual reports filed.

The report was signed by C. S. Mitchell, chairman; B. W. Fernald, and John M. C. Horn.

In view of the fact that none of the members of the committee could attend this year's forthcoming convention in Atlanta, acting President Webster was empowered to appoint a special representative.

A letter was also read from B. W. Fernald, Oakland, Cal., urging the committee to take such steps as possible toward having the annual reports made up from loose-leaf forms and afterward bound. Such a procedure he claimed would materially cut down labor costs in their preparation, for now it is necessary to fill in these seventy-two page reports entirely by hand. With the loose-leaf system the work could be typewritten and copies run off on a duplicating machine.

ELECTRIC RAILWAY COST ACCOUNTING

In introducing J. H. Bowman, Acting President Webster stated that he believed the time had come when cost accounting should be considered an important matter and perhaps within a short time the accountants would be called upon to furnish such information from their files. It was a question of how far to go into details and he hoped that Mr. Bowman's address would prove of much interest. An abstract of Mr. Bowman's paper on "Electric Railway Cost Accounting" is given elsewhere in this issue.

Following the presentation of the foregoing paper, George F. Dinneen, Holyoke (Mass.) Street Railway; M.

W. Glover, West Penn Railways, Pittsburgh, Pa., and Elmer M. White, Binghamton (N. Y.) Railway, discussed it.

Mr. Dinneen stated that he was of the opinion that the synthetic system as outlined by Mr. Bowman goes a little farther than the expense of maintaining such a system would warrant. It is questionable if the majority of electric railway companies would desire, at the beginning, to carry the cost system along to the point of allocating the cost of service per car seat unit. The benefits accruing from the synthetic system, he believed, would be more quickly attained by first ascertaining the cost in detail of maintaining the property and its relation to the investment.

It was his opinion that a cost system based on the second classification formulated by Mr. Bowman would furnish accurate cost data making possible the efficient management of the property. Information relative to the other classes could be derived from this information.

Many electric railways have already installed cost systems covering the maintenance using the Specific Job plan of cost-keeping. In the division of Maintenance of Way and Structures, the track, and roadway, and power distribution system could be divided into geographical sections, each section to be covered by a specific job. Bridges, structures and buildings could be treated in like manner. Superintendence and miscellaneous expenses could be allocated to the specific jobs on the basis of percentage of total expenditures on each job, with the exception of salaries and expenses, which should be charged directly to the job. Each job could be subdivided to show the cost of ballast, ties, rails, rail fastenings and joints, special work, paving, etc., and labor. By using a decimal system of numbering, track and roadway labor could be further subdivided into cost of excavating to bottom of ties, excavating below ties, handling ballast, ties, rails, rail fastenings and joints, alignment of track, paving, etc. Labor cost of cleaning and sanding track could be divided between the geographical sections applicable and material and miscellaneous expenses apportioned on their percentage to labor costs. Cost of removal of snow and ice could be treated in like manner.

In the division of maintenance of equipment, general practice calls for cost records of the different types of equipment used, the purpose in mind being to determine the type of equipment best suited for any specific use. While it is essential to know the comparative cost of maintaining different types of motors, controllers, air equipment, trucks, etc., the knowledge of maintenance costs of each individual car is most important, and may be obtained without interfering with the record of costs of parts or types of equipment.

To obtain such costs and still have a knowledge of maintenance costs of

different types of equipment, a specific job number could be placed upon each car body and electric equipment therefor, exclusive of motors, and also a job number for each set of trucks, including motors. By dividing the car into two jobs, confusion will be eliminated upon transfer of trucks and motors from one car body to another.

Jobs covering car bodies and electric equipment, exclusive of motors, could be further subdivided if desirable into cost of painting, repairs to car bodies, floors, controllers, trolley parts, trolley wheels, air equipment, etc., and jobs covering trucks and motors could be subdivided into repairs to trucks, wheels, axles, journal boxes, armatures, fields, etc. These subdivisions would permit the ascertainment of the cost of any type or parts of equipment by summarizing such types or parts of each job.

Allocation of the cost of shop equipment, shop and miscellaneous expense could be made to each specific car job by still a further subdivision by basing the use of machinery on the machine-hour plan.

The item of depreciation, Mr. Dinneen said, has been given very little attention by the electric railways in general, for but a few companies have made adequate charges to cover this item, due partly to the fact that, through lack of cost data, they assumed that depreciation was being fully cared for by renewals and replacements. With a cost system, similar to the one as outlined, no difficulty would be encountered in arriving at the item of accrued depreciation applicable to each unit. Such a segregation of expenditures would give a flexible and sound system of cost finding for these two maintenance divisions and would permit of unlimited detail for the larger electric railways, and of more concise information for the smaller companies.

M. W. Glover said it was difficult to add anything to the excellent paper presented by Mr. Bowman. It clearly shows the desirability of a system of cost accounting for electric railways, yet points out the danger of going to too great an expense in securing the information. It also shows that while the present classification of accounts is not primarily a cost accounting system, it can be adapted to that purpose, and it is the duty of accounting officers to find the means of determining costs of operations accurately as this information is needed by operating officials and they are entitled to it. He thought the plan should have a fair trial.

Mr. Glover then pointed out that when a statement of the cost of power is made, and it includes only the costs as shown in the classification under the general account "Power" and does not take into consideration taxes, depreciation, interest, damage costs, general overhead, and similar items, the statement is misleading. It may result in a small power house being continued in operation under the mistaken idea that power can be generated at less cost

than if purchased from a large power company. In any cost studies, however, the engineering department must cooperate with the accounting department in order to obtain satisfactory results.

Elmer M. White told of the shop accounting system recently installed in Binghamton. The shop time cards are filled out usually by the workman to show the cars worked on. In some cases when the workman cannot write the foreman does it. The card also indicates whether the work was done on the car body, trucks, motors, etc. The time cards are later posted by a cost clerk on a distribution sheet. Individual car card records show the time worked as well as the material used. On the reverse side of this card is the daily car mileage record so that at the end of the year the maintenance costs of any individual or type of cars can be determined. A similar system is kept for special trackwork layouts. Depreciation can be figured either monthly or yearly and for each car or group of cars as may be desired.

The meeting ended in an informal round table discussion on the methods involved in charging off depreciation and the practices of allowing for depreciation in income tax reports.

Tuesday Afternoon's Session

At the opening of the meeting on Tuesday afternoon, I. A. May, Comptroller the Connecticut Company, read a resolution to the memory of former President John J. Landers, of the Accountants' Association, which was passed by a rising vote of the delegates.

Arthur Robert Weston then presented the joint report of the stores accounting committee of the Accountants' Association and the committee on purchases and stores of the engineering association. This report was printed as a part of the proceedings of the Engineering Association last week.

W. L. Davis, auditor Lehigh Valley Transit Company, in discussing the report said in part:

"Although the work of the Committee is described very fully in the Joint Report as submitted, it may be well to supplement the report in a few particulars.

It should be remembered that the report has been prepared with a view toward establishing certain recommendations as to fundamentals, and does not attempt to set forth any suggestions as to accounting methods to be used in arriving at final results as reflected in the general ledger; neither has it been drawn up for the purpose of establishing any particular accounting system. I understand that these features were purposely omitted, as the opinion among the individual members favored the consideration of the principles involved in the Material Classification and the standard methods to be used in maintaining records of physical stock before the subject of the relation between the storeroom material records and the general books, as we feel confident that a general discussion of the former matter would tend to bring out

facts which would be of material assistance in the preparation of accounting systems and basic data for financial reports.

The standard Material Classification is, we believe, almost a necessity, but it may lose much of its value unless, upon installation, it is thoroughly explained to and understood by the various individuals responsible for distribution of accounts. If the stores account is subdivided in accordance with the classification as recommended, it will be necessary to classify not only the debits from vouchers, payrolls, etc., but also the stores credits from material issued. A misunderstanding of the classification on the part of one or more clerks or foremen might easily destroy its efficiency and make the final figures not only valueless, but positively misleading. This situation will require considerable "missionary work" on the part of the chief accounting officer, and his immediate subordinates, as erroneous application of sub-account numbers could soon transform a very useful and valuable classification into a veritable nuisance. This factor should also be considered in connection with the recommendations as to standard material reports, for obvious reasons.

While the standard Material Classification will be very desirable for the larger roads, it might be well for the members of the Association to make suggestions as to an abridged classification to be used by companies whose requirements might not be quite so extensive. Such a classification might be prepared in the same manner as the interstate commerce classification has provided for Class B and Class C roads, and could be considered by the committees.

I believe I am expressing the opinion of the committees in connection with the recommendations as to stock books in saying that these stock books are suggested with a view toward supplementing the "amount" or "value" ledgers with a record that will enable the storekeeper to establish a method of maintaining a permanent check between the ledgers and the physical stock, and are not intended to be considered as a substitute for the ledgers.

Personally, I feel that the work of the Stores Accounting Committee has just begun and that it will be able to render valuable service to the Association in the future if its work is continued.

FURTHER DISCUSSION ON STORES ACCOUNTING

Mr. Boylan suggested that it would be well for an additional column to be added to exhibit C to make space to carry an inventory. Mr. Cass of Philadelphia commented that the stock book had been adopted by the Philadelphia Rapid Transit Company, and had been found to be very helpful and of greatest service to the storekeeper. For this reason the order of items in the record is so arranged to give a sequence which will aid him in visualizing the stock on hand. The question was raised as to difficulties in securing the use of a

uniform name for any material or equipment. Several expressed difficulties along this line, and one delegate said that his company is trying a cross index system, giving the nickname and after it the correct name. It would then be a duty of the stores clerks to supply the correct name.

The convention then took up the question of a Past President's badge and decided to authorize the executive committee to adopt a design of Past President's badge to be presented to all present and future Past Presidents.

ROUTINE ACCOUNTING

A paper was then presented by H. C. Hopson of New York on the "Adaptation of Routine Accounting Results to Particular Uses." This paper is presented elsewhere in *ELECTRIC RAILWAY JOURNAL*. Mr. Hopson took occasion to amplify by example some of the statements in this paper.

In discussion of this paper I. A. May said he was glad to hear Mr. Hopson urge that all accounting be done in the office which makes a business of accounting. Mr. May said he felt very strongly on this point. He said he had recently read several articles by engineers advocating perpetual inventories of physical property and some advocating a special department for such work. He said he had tried to answer this type of argument in a recent article in the *ELECTRIC RAILWAY JOURNAL* (see issue of Sept. 10, page 398) in which he pointed out that all records should be kept in the accounting office. M. R. Boylan, Auditor Public Service Railway, called attention to the standard classification of accounts as an answer to how the matter of what is included in the tax account should be interpreted to commissions. Mr. Boylan said that if accountants would always emphasize that their accounts are kept as defined in the Interstate Commerce Commission text there should be no difficulty.

Mr. Hopson pointed out that income tax is a part of the tax account and should be subtracted the same as other expenses before net income is figured. Mr. Hopson thought it was unfortunate that Congress refers to the present ten per cent and proposed fifteen per cent corporation tax as a "normal tax." Of course, a commission examines the operating account and a commission may disallow any tax item it may choose to disallow just as it may choose to disallow what it calls an excessive manager's salary or any other item of expense which it questions as being unreasonable.

Next on the program was the paper on "Construction Accounting" by W. L. Davis, auditor Lehigh Valley Transit Company, Allentown, Pa. This paper appears in abstract elsewhere in *ELECTRIC RAILWAY JOURNAL*.

CONSTRUCTION ACCOUNTING

C. E. Yost auditor and assistant treasurer, Wilmington & Philadelphia Traction Company, in discussing Mr. Davis' paper, said, in part:

"The manner in which Mr. Davis

has handled the subject of construction accounting leaves very little for the rest of us to talk about. Every phase of the subject has not only been touched upon, to use his own language, but has been so clearly and completely set forth that if copies of his paper were put in the hands of all of our timekeepers, distribution clerks and bookkeepers, it would probably do more good than paying for special courses in accounting.

"It may be that the accounting department is at fault in continually trying to educate the various foremen and other employees from whom we receive the original records of material and labor distribution. In many cases after incessant hammering on the subject during the summer and early fall months, we see signs of embryo intelligence, but so soon as the first flakes of snow are scurrying through the atmosphere there comes an order from the operating head to stop all construction work for the winter, and before the accounting department is aware of any change in plans the 'hopeful' has gone from the property.

"Would it not pay in the end to have the accounting department furnish the necessary timekeepers and material clerks from our own force and keep them employed on some other work during the winter? No doubt the engineers in charge of construction work would resent having around on the job employees who would not be responsible to them. Yet how often do we find that on Jan. 1, the engineer himself has accepted another position and with him have gone valuable field notes and other data which he regards as his personal property.

"One of our Wilmington men once made a suggestion that each department keep a diary of its work throughout the year and in January turn them over to some one who would compile a complete history of the year's doings. While we have not taken up the suggestion, there is no doubt but that such a work if kept up each year would be invaluable fifteen or twenty years from now, especially at such time as a revaluation of the property might be required.

"The present accounting practice is to have various operating departments furnish assistance of various kinds at cost in the construction of new lines and extensions. No doubt the commissions would object to the inclusion of a profit on such labor, but if the work was done by an outside contractor not only would the actual cost be greater but the contractor's profit would be accepted without question as a proper capital expenditure. Reconstruction of existing lines should perhaps be excepted in taking profit on services rendered by other departments, but does it not seem unfair to compel auxiliary departments to do the construction work at cost and often at the expense of allowing their own regular work to suffer by reason of their transfer?

"There are no doubt numerous cases where in the past, especially during a change in ownership, capital has been charged with items which were at least questionable, but the practice now seems to be that when reconstruction is necessary, operating expenses should stand as much of the cost as possible. It is not fair, because a tie was in a certain place years ago and that there will be a tie in the same place after reconstruction, that the cost of the new tie should be considered as maintenance. If your roadbed was reconstructed in 1920, you should be entitled to a return on the actual present cost of the new road with ties at \$1.50 each rather than 25 cents for those placed in 1900 and on labor at 50 cents per hour rather than the 10 cents or 12 cents paid twenty years ago for the original installation. It seems that we owe some consideration to the stockholder as well as to the bondholder.

"We are very apt to look with disdain upon the simplicity of the old methods of accounting, yet with all of our ingenuity for creating suspense accounts, sub ledgers, work orders, executive authorizations and control accounts, it is doubtful whether the accountant of 1950 will be able to glean much more essential information from our books than is found in the records of the previous generation. The supporting records will be so voluminous that in time they will be considered as junk and destroyed, leaving only the control accounts in the general ledgers.

"Most of our electric railway systems have gone through several consolidations, each one producing its crop of connecting special work and short links of track so that without maps distinctly showing the ownership of each foot of track, it would be impossible to tell what property is covered by the various bond issues. These maps should be made in sections and reduced to sheets 8½ x 11 in. for convenience in binding. One set should show all of the various items of material used in the construction of the track and overhead with as much information as possible concerning the type of the material used, by whom manufactured, etc. Another set should show the various deeds or rights of way together with notation of fencing, crossings and other requirements as to where same can be found both in the company's document files and in the county offices. On a third set of these maps should be shown each time the property was reconstructed, the job order on which work was done and the cost thereof. These sectional maps bound in book form would be worth their cost several times in their convenience and time saved over an ordinary index to locate the proper agreement relating to any section of property or the necessary details for the write off if retired from service or reconstructed.

"One other suggestion I would like to make and that is, the establishment of some method of segregating in a

special memorandum all costs, no matter in which classified account they may be charged, pertaining to expenditures made for the benefit of the community as a whole and which may be considered as taxes, such as street paving, assessments toward the building of bridges, relocation of sewers, etc. While a great deal of money has been spent for these purposes in the past the amount which cannot be accurately determined, we can make a start now and it will be surprising how large will be the total in the next few years and it may be the means of preventing considerable increases in our future tax burdens."

Wednesday's Session

The greater part of the Wednesday afternoon session of the Accountants' Association was taken up with joint meeting with the T. & T. Association, the report of which was published in the issue of Oct. 8 in connection with the report of the T. & T. Association. At the end of that joint session the accountants reassembled for their final meeting.

After the meeting had been called to order, Mr. May, of New Haven, urged greater interest in the Question Box in *Aera*. Mr. Glover indorsed Mr. May's suggestion, and said that he had urged accountants to take an interest in the Question Box, but it fell flat. Continuing, he said that members of the association do not always take the trouble to answer letters. M. R. Boylan explained that many of them have been tied up in rate cases which have been frequent recently.

The chair then announced that W. L. Davis would probably be the representative of the association at the Atlanta convention.

The report of the committee on resolutions was then presented by M. R. Boylan. The thanks of the association were extended to the parent associations, its committees, the chairman of the program and other committees of the Accountants' Association, the technical press and the speakers at the Accountants' meetings.

The committee on nominations then presented the following as officers for the ensuing year:

President, Frederick E. Webster, vice-president and treasurer Massachusetts Northeastern Street Railway, Haverhill, Mass.

First vice-president, W. G. Nicholson, secretary and auditor Omaha & Council Bluffs Street Railway, Omaha, Neb.

Second vice-president, E. M. White, treasurer Binghamton (N. Y.) Railway.

Third vice-president, W. A. Doty, auditor Denver & Intermountain Railroad, Denver, Col.

Secretary-Treasurer, F. J. Davis, auditor's department, Public Service Railway, Newark, N. J.

For members of the executive committee, J. J. Duck, general auditor Chicago Surface Lines; R. N. Stevenson, chief clerk to comptroller, the

Connecticut Company, New Haven, Conn.; Wallace L. Davis, auditor Lehigh Valley Transit Company; G. H. Caskey, auditor Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.

These officers were unanimously elected. Each of the newly elected officers who were present made a short address, and the meeting adjourned.

C. E. R. A. Engineering Council Meets

THE first meeting of the Engineering Council of the Central Electric Railway Association was held in the association offices at Indianapolis, Ind., on Sept. 26, 1921. The purpose of this meeting was to formulate a working basis in order that the different local sections and the general organization might properly function. It was decided that the sectional meeting would be a one-day session only, to be held three times each year, the first meeting to be held some time during the first half of November, the second during the latter part of February and the third during the month of May. There will be one general meeting of the entire organization at the annual meeting of the Central Electric Railway Association, at which time a half-day session shall be allotted to this organization on the program. In the holding of sectional meetings it is the general purpose that each section send a representative to the meetings of the other sections, in this way keeping in closer touch with the work throughout the entire territory. All the meetings of the local sections will be in the nature of a round-table discussion, as it is believed in this manner that the members will be more spontaneous in the discussion of engineering problems and better results will be obtained. Questions for discussion are to be supplied by the various members attending, but as an outline for the first meeting questions have been proposed by the Engineering Council.

Another meeting of the Engineering Council will be held the latter part of November in order to go over the work of the various sections and formulate a report to be rendered at the annual meeting of the C. E. R. A.

Snow Removal Problems Discussed

AS A result of a recommendation for a discussion on snow removal made by Henry L. Doherty after last February's severe storm, the material handling section of the American Society of Mechanical Engineers in New York discussed this on Sept. 23. The discussion centered on various snow-removal devices, including mechanical loaders, rotary plows and snow-melting devices. Plans were presented for briquetting snow so as to reduce its volume and enable the material to be piled along the street in small areas. Mr. Doherty expressed confidence that a practical scheme would be developed.

Electric Railway Cost Accounting*

Manufacturers' Cost Accounting Systems Can Be Adapted to Electric Railway Operations to Determine Cost of Operation by Divisions or Routes When Results Obtainable Warrant Expenditure

By JOHN H. BOWMAN, C. P. A.
Price, Waterhouse & Company, New York

"**C**OST accounting" as the term is used in manufacturing describes a formal system of accounts wherein the cost of each product at each stage of its process is determined. There are two plans of cost accounting. The first may be called the "analytical" method, as it consists in analysis of the determined cost of the operations as a whole; the second may be called the "synthetic" method, as it builds up the cost of each operation separately as a collateral procedure to the compilation of the aggregate cost of operations.

Scientific cost accounting in manufacturing organizations is a development of the last twenty-five years. At first estimates of cost were thought sufficient, but as competition became keener it was found to be dangerous to rely only on these cost estimates. The desire to determine more accurately the annual profits also furthered the development of cost accounting. A further benefit, not fully realized at first, derivable from the cost records is the guidance that they afford to the management in indicating waste and inefficiency.

MODIFICATIONS OF COST ACCOUNTING IN TRANSPORTATION

In the adaptation of the manufacturers' idea of cost accounting to transportation certain fundamental differences in the two lines of enterprise have to be kept in view. It is not unreasonable to conceive of transportation service as a commodity in the production of which the processes are comparable with manufacturing processes. To the manufacturer all of the information which he ordinarily requires is provided when he secures the cost of each of his products so compiled as to show the cost of each of the various progressive stages in its process; the factory cost before providing for selling and administrative expenses furnishes the figures required for inventory purposes and the full cost, those necessary for price fixing, etc. Transportation cost on the other hand, while it affords the necessary information for comparative study whereby losses, waste, etc., may be detected and localized, does not provide sufficient information to be of real value in connection with many questions of management policy, or for comparison with rates. The reason for this is that a very large element in transportation service consists in providing, for the use of the patron, exceedingly costly facilities in the form of road, equipment, etc. The value of these facilities is vastly greater in proportion to the actual cost of the service provided than the value which a manufacturing plant



JOHN H. BOWMAN

bears to the total cost of its output. The relative importance of this factor is, of course, widely variable in transportation enterprises according to the location of lines, the density of traffic and many other factors, but to indicate roughly how important an element it is, it may be mentioned that a study, made on the basis of pre-war conditions, for certain large electric and steam road properties, for which I was able to secure approximate appraisal values of the property, indicated that a return of 1 per cent on the value of the property used in operations was equivalent on the average to about 5 per cent of the total operating expenses and taxes in the case of the electric railways chosen, and to a substantially larger percentage in the case of the steam roads. The data, therefore, which an electric railway company needs are not plain cost data, but should include also corresponding data relative to return on the investment. It is neither necessary nor desirable in the practical application of this principle to merge the two sets of figures at any point.

Another fundamental difference between manufacturing and transportation cost accounting lies in the fact that the product in manufacturing is the commodity which is sold, whereas the product in transportation is the service provided, which may or may not be sold according to whether or not the traffic offers itself. Still another difference lies in the nature of the product and processes and the consequent methods of apportionment of common expenses. In manufacturing much of the greater part of the expenses ordinarily consists of the material which enters into the product and the labor cost of fabrication. The remaining expenses are very largely in the nature of supervision or are so closely related to the processes of

fabrication as to render direct labor cost a sound basis of apportionment of most common expense. In the case of transportation or of the electric railway, in particular, there are certain operations, such as power production or shop work, which are fundamentally of a manufacturing character and to which the principles of manufacturing cost apply, but in many of the most important apportionments, as say between individual lines, statistics of use afford a very much more nearly correct basis for apportionment than do labor costs. For example, if a section of track be used in common by two or more lines, the most nearly correct basis for apportionment of the cost of its maintenance among the lines is probably a composite of two factors, which are best described as "beneficial use" and "destructive use," a basis in which due consideration is given through the former factor to natural deterioration and through the latter to the relative track-wearing qualities of the cars operated over the several lines which use the common track. This principle bears on a considerable number of elements of transportation cost, which it is impracticable to take up in detail within the limits of this paper.

Other distinctions between the manufacturing and the transportation cost accounting problems could be developed, but those mentioned sufficiently indicate the fact that manufacturing cost methods cannot be transferred bodily for application to electric railways and that the cost methods for the latter must be developed along their own, though somewhat parallel, lines, and further should be considered always in conjunction with the element of return on investment.

LIMITATIONS OF COST DATA OBTAINABLE BY ELECTRIC RAILWAYS

The possibilities in the application of cost accounting to electric railways are first, as regards the extent to which the operations as a whole may be subdivided into individual operations or "products" (if the manufacturing analogy be kept in view), and, second, as regards the minuteness with which the elements or "processes" which go to provide the service may be subdivided.

Considering the subdivision of the operations we may take, as an illustrative case, an electric railway system operating both street and interurban lines and maintaining its own facilities for power production, car repairs, etc. On such a line the ultimate services rendered are, say the transportation of passengers and express over various lines. There are two plans under which the subdivision might start; first, by separation of the costs of different classes of service, and second, by subdivision by districts of the costs of handling all traffic. In any separation by classes of the cost of handling traffic over the entire system, where a considerable part of the separation has to be made on district or line figures, it is reasonably apparent that the separation into classes should be the last, or almost the last, stage in a subdivision.

*Abstract of paper presented at annual meeting of American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 3-5, 1921.

The logical first step in subdivision, therefore, may be taken to be that into districts. Next, the service in a district is obviously the aggregate of services on numerous lines in the district, so that subdivision of the district into lines is the logical second step. The operation of each line is the aggregate service rendered by various car runs, some of which very likely may be operated for a shorter distance than others through the cars being turned at points short of the end of the line. It seems clear, therefore, that the logical third step in subdivision is into individual runs. It is hardly worth while following the logical subdivision beyond this point because it is doubtful whether there are many cases in which run costs are worth determining excepting as a means of separation by classes of traffic. Ignoring, then, possible further subdivision by movement, the final step is the separation among the various classes of traffic on the line, or whatever other unit the subdivision is extended to.

Turning to the question of elements of operation which go to make up the cost of the chosen units of service, it may be said that the classification of accounts, as prescribed by the commissions, must be used as a basis in order that the relationship of the cost and general accounting systems may be maintained. A certain complication, however, is offered by the various charges, which are becoming more and more frequent in common practice and which are provided for by the commissions, to effect an equalization as between years of certain types of expense. Notable illustrations of these equalization charges are the provisions for deferred maintenance and for accidents and casualties, according to the generally accepted theory of the present day, it is proper that provision should be made for maintenance charges when the maintenance itself is deferred and for accidents and casualties to provide as a sort of insurance against the more serious accidents which ordinarily occur only at intervals of years. The idea underlying this is primarily to avoid misleading the investor by reporting excessive net income when there is reasonable prospect of abnormally large expenses in a period to follow. It has the defect, however, of concealing the actual operations of the year, except to a mind trained to consider financial statements. For administrative purposes the prime concern is, of course, with the actual outlays and not with the equalized figures. Perhaps the most practical way of meeting this condition is the preparation of the company's monthly income accounts in three column form—the first to show the actual operating expense without equalization charges, the last to show the equalized amounts in the form in which they are presented in the published accounts, and the middle column to show the difference between the first and last, and thus reflect the net effect of the equalizing charges on the accounts of the month. Under this

arrangement the cost accounting system will support the cost of operation as presented in the first column. In such a treatment of the problem, however, it is probable that an exception should be made in the case of depreciation as distinct from provisions for deferred maintenance. It would seem that depreciation, if on a sound basis, is more closely akin to actual outlays than are the other equalization charges or credits. This whole question of equalization charges, however, is an open field for consideration.

To summarize, it is practicable to formulate a synthetic cost system that will provide the cost of the traffic as a whole, or of each class of traffic over each district or individual line, or even individual car run, and (provided a detailed valuation of the properties is available) to show collaterally the corresponding return on the investment in facilities used in the operation. It is practicable in the course of this compilation to maintain cost accounts for each individual sub-unit of operation, such as power production, car repairs, etc., and for maintenance in as much geographical detail as is desired. Finally, it is practicable to maintain these cost accounts in such a way that the aggregate cost of all of the services provided for carrying the several classes of traffic over the several lines in a given period will equal in the aggregate the total cost of the transportation service provided by the company.

BENEFITS OBTAINABLE BY THE ELECTRIC RAILWAY

The facilities afforded through cost accounting cannot be listed in detail as almost every company has problems of its own which may be met by this means, but the most important will probably fall under one or other of the following four classes:

1. Comparisons of costs with tariff rates or other revenues to disclose whether and to what extent a service is profitable, or the reverse, and why it is so.

2. Comparisons of details with those for other services, or for the same service in other periods, to localize losses through waste, irregularities, incompetence of sub-officials, or mismanagement and to facilitate and guide administration generally.

3. Information for use in connection with existing or proposed contracts or negotiations.

4. Information for board or stockholders or for publicity.

Comparisons of costs with traffic rates is the logical development of a principle that has been recognized in cases before courts and commissions for many years but, in the lack of adequate cost data, it has either been confined to the cost of the operations of a group of lines as a whole or has been developed by an analytical cost study, which is usually difficult to establish to the proper satisfaction of the judges or commissioners if, as is usually the case, there is active opposition.

Whether or not relinquishment of the

plan of averaged fares within the cities, under which the street railway systems, as distinct from the interurban, have grown up, is under consideration as a possibility, it seems almost self-evident that for the information of the management full particulars should be available to show the profit or loss on the operation of each line.

The calculation of return on the investment in property used in operation, made along with the cost computations and accompanying them, contributes materially to the value of the results by lines. There are obvious advantages in making these return calculations on the basis of 1 per cent on the value of property used in the various operations, inasmuch as this rate involves a simple calculation and does not commit the company to any fixed rate of return as being an adequate one. There is a variation in what constitutes a fair rate of return from year to year and what is a fair rate from one point of view may not be a fair rate from another. The results can be converted to any rate desired by mere multiplication.

The possibilities of the use of costs for comparison of one service with another or with the same service in another period increase up to a point, with the minuteness of detail, but apart from the limitations of expense, cost details can be carried to a point where they cease to be useful for practical purposes. For ordinary use in comparisons the computations of return do not add much to the usefulness of the detailed cost data, but when the broader policies of operation are under consideration the return data may become of prime importance. For example, if there is a question as to the best location for a new carhouse as between two points, one at a central point in a city and the other at a somewhat out of the way point, it is obvious that the comparison to be made is between the additional operating cost entailed by the out of the way location and the additional return element resulting from the greater investment in the central location. The value of cost data in connection with the arrangement of a joint facility or lease agreement needs no argument and it is obvious that the element of return must be available along with the cost data to render them of best use in such cases. In matters such as negotiations with a city over a franchise involving maintenance or other undertakings, or in negotiations with labor organizations, detailed cost data are of more or less value according to circumstances.

For the purpose of information, whether for the use of the board, or the bankers, or for the publicity department, it is doubtful whether as a general rule it is necessary to add materially to the information which is made available by the cost accounting system necessary to provide the benefits already described. Further data required for any of these purposes can be better made by special cost studies.

There are certain underlying prin-

ciples that must be met if the system is to be of value. These are, first, that there must be an ultimate allocation of all expenses without duplication; second, that the cost accounts must be built up logically and intelligently step by step, and, third, that the system must be a continuous one consistent in its methods from month to month.

One procedure whereby cost computations can be made is along the lines that have been prescribed by the Interstate Commerce Commission for steam railroads. The development of this procedure is traceable through certain decisions of the Wisconsin Commission in 1907 and 1908, through computations by the Post Office Department relative to various mail service costs in 1909, and to its promulgation in 1915 by the Interstate Commerce Commission as a basis for the separation of freight and passenger train expenses on steam railroads. This procedure applied to electric railways would call for successive subdivisions and apportionments until the desired degree of detail should be attained. In the first subdivision expenses would be allocated direct to the operating units if directly assignable, and if not they would be treated as common expenses. Common expenses would in turn be apportioned among the various operations on the basis wherever possible of ratios determined from closely related statistical data, item by item, and finally those not apportionable in this manner would be treated as general overhead expenses and apportioned on some general basis such as the ratio of the other expenses of the group to which they pertain, or as a whole. Further reapportionments along similar lines would perhaps have to be made for further subdivisions as has already been noted. This method is distinctly an analytical one. For special cost studies, or for approximate regular determinations, it serves fairly well provided the object is merely the entire cost of each of the several services. The method does not afford the sort of detailed information that is necessary to furnish really valuable aid for administrative purposes. To secure data which will be useful the synthetic procedure, which has already been roughly outlined, seems to be requisite. In a synthetic method it is possible to avoid the progressive compounding of the elements of error that are unavoidably entailed by averaging or other arbitrary apportionments.

COST FROM SUB-UNIT ACCOUNTS

In the practical installation of a synthetic system there should be opened a cost account for each principal unit or sub-unit of operation, to which charges are to be made direct from the vouchers, payrolls, etc. At the end of the month the process of closing the sub-unit accounts entirely into the principal unit accounts should be effected sometimes, perhaps, through the opening of additional sub-unit accounts for assembling and distributing costs. In all of these accounts provision should be made for cost fig-

ures and for the 1 per cent return on the investment in parallel columns. In closing out the sub-unit accounts the use of performance or statistical data would be necessary and provision should be made for the careful compilation of what data of this type are to be required. In some cases mechanical devices would be found worth while, as for instance in the matter of the consumption of power. If operating conditions as regards grades, loads, etc., are practically uniform over the lines of a system, it would probably be correct to apportion the power consumption on a car-mile basis over the lines, but according as the conditions on the several lines become more and more dissimilar the importance of ascertaining the actual power consumption on each line increases and the benefit derivable from the installation of the necessary devices to determine such consumption becomes more marked. As has already been mentioned, statistical data involving the traffic that is actually offered should be avoided in cost computations. It should be kept clearly in mind that the cost of the service provided is the immediate aim and that the traffic that offers itself is a factor distinct and separate. Neglect of this principle introduces one of the most confusing of all types of variation in cost data, namely, the composite result of two variables.

Perhaps the most practical question in the whole cost problem is that of how to establish a scientific cost accounting system without a radical increase in the expenses of the accounting department, the justification for which cannot become evident through results for some time after the increase begins. The formulation of a standard system by a committee is not at this stage of experience a procedure to be advocated. It is better that each of the more progressive companies should develop its own system to a point and thereby be in a position to discuss, knowingly, the problem of standardization, which can then be advantageously assigned to a committee for recommendations. Meanwhile general discussion of the basic principles and procedure is invaluable.

Gradual development of a scientific cost system along synthetic lines is practicable because of the elastic character of the synthetic plan. To a great extent the shop and power cost systems which are now commonly kept can be incorporated in the system with a minimum of change for the time being, and pending the full development of the system many apportionments can be made approximately on an analytical basis. For example, the distribution of power cost may be made temporarily on, say, a car-mile basis and the basis of actual consumption deferred to a later stage of development of the details of the cost system.

The simplest practical plan would perhaps consist in, first, choosing as principal units of operation, not each line, but a limited number of distinctive lines, the costs for which gave rea-

sonable promise of affording especially valuable information, and treating the other lines as one or more groups. Separation of cost as between classes of traffic might be undertaken at this stage or not according to the local importance of the question. Cost accounts would, of course, have to be kept from the outset with the more important sub-operations, such as power production, car shops, carhouses, etc., but the distribution of these charges might be made for a time on an average cost basis direct to the principal units of operation.

The services and activities reflected by the general and overhead expenses, which are also most conveniently to be treated as sub-units of operation for cost purposes, could be similarly apportioned. The results would be a fair approximation of the cost of operation of each principal unit and should aggregate the total cost of operation. The basic plan would be synthetic, but many of the steps analytical, and while the profit or loss on operation of a chosen unit would be indicated approximately, the details would be of but limited value as a means of administrative control of operations.

Offsetting the shortcomings mentioned would be the facility with which more precise methods and further subdivision of operations could be substituted one by one without disturbing the continuity of the system. Similarly as regards the element of return on investment, provision should be made from the outset for return computations along with the cost figures, and used if the figures are available. If not, a partial computation may be practicable. Most companies, for example, have the investment value of rolling stock at least. "Car service" must be provided for as a sub-unit of operation to be charged with maintenance, cleaning, supplies, housing expenses, etc., and the total cost distributed among the several lines on an appropriate basis. If valuation data are fully available, there should be shown in the space provided for return on investment, the figures in respect of the cars themselves, the shops, the carhouses, etc. If the valuations are only partially available, it may be feasible to base on actual figures the return on the investment in equipment and on rough approximations, that on the investment in shops, carhouses, etc., which are properties of a type for which some sort of value estimates are nearly always on hand.

CONCLUSION

It is impossible with so broad a field to do more than sketch an outline of the thoughts that seem to have a most direct bearing. There are certain principles which I have endeavored to develop which seem entitled to special consideration in the development of a general plan of cost accounting for electric railways and I shall conclude this paper by repeating them.

First, what the electric railway needs

to correspond to the cost accounting system of the manufacturer is what may, pending the discovery of a better term, be described as a "value accounting system," embracing not only the determination of the costs of the various services but also the return on the investment in property used in rendering these services.

Second, that the electric railways through cost accounting methods can practicably secure benefits of great value.

Third, that in the formulation of a cost system the attractions that are offered by the analytical method are by no means equal to those offered by a

synthetic procedure, which, in addition to being more accurate and more illuminating in its results, is more elastic and, therefore, better adapted to gradual establishment as a part of the company's accounting system.

Finally, it must be borne in mind in all considerations of costs or their derivation that cost figures are approximate and not absolute. The more minute the detail with which they are prepared and the more we come through experience and study to understand them the nearer they can be brought to the theoretical, though never quite attainable, true costs, which we are always seeking to obtain.

the accuracy of the basic charges, but these items should be investigated from time to time by the general accounting department, and tests of their accuracy should be made. This branch of the work may be facilitated to some extent if the payroll and material distributions are summarized in the general office, but if the organization of the company provides for this work to be handled in division or district offices, considerable outside accounting supervision is necessary. A portion of the garage and stable expenses should be allocated to the construction costs, with due regard for commission requirements, and this result may be obtained by a monthly distribution of the automobile costs, based upon the mileage records. The garage and stable expense account should be carried as a deferred item and cleared to the various accounts as soon as the monthly mileage is determined. It may be necessary to carry this account over the closing period as a suspense item, and in such a case the suspense account will be cleared in the following month. The charges to garage and stable expenses may be subdivided in order to arrive at such detailed costs as may be considered desirable, but this feature is not absolutely necessary. A number of charges to construction are made on special vouchers, and these items of course can be readily distributed and charged to the proper accounts through the accounts payable record.

DISTRIBUTION OF OVERHEAD COSTS

Indirect or overhead construction costs should receive most careful consideration, as it is just as erroneous to pursue an ultra-conservative policy as to make mistakes in the opposite direction. Construction costs should clearly include some general expense items other than such charges as are made direct, the most important item being interest. This can easily be provided for during the time of construction and before the property is turned over to the operating department, as construction funds used during that period are usually borrowed for the purpose and the cost of this money is easily determined. When money is borrowed for a particular construction job and is not used for any other purpose, the capitalization of such interest does not present any difficulties. If, however, funds are borrowed for general construction purposes, and not for use on any one piece of work, the question of proper allocation will naturally arise, and the monthly accruals or amortization of interest may be charged to the various construction jobs in the ratio that the various direct charges during the same periods bear to the total. Still another circumstance may be mentioned (with particular reference to the troubles during the past few years), when the operating company is required to use its own funds, in the absence of borrowing capacity, to finance necessary and obligatory construction. In this case, it is clearly proper to include in

Construction Accounting*

The Author Outlines the Practice to Be Followed from the Beginning of the Work to Its Conclusion and Points Out the Pitfalls to Be Avoided

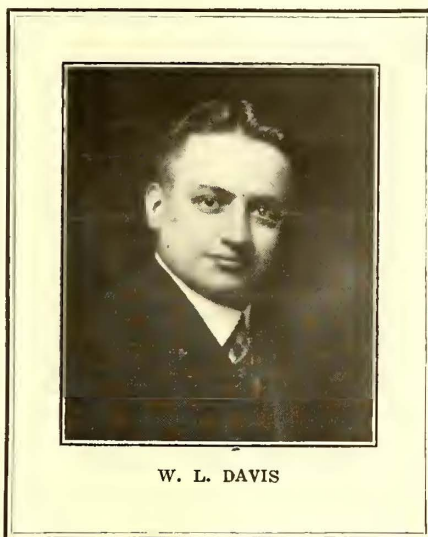
BY W. L. DAVIS

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THE charges to construction costs may be divided into direct and overhead.

In direct charges, the fundamental principles of distribution should receive earnest attention. The most elaborate accounting and cost systems, together with the most complete classification of accounts, are absolutely useless without a thorough knowledge of the elementary differences between construction and operation on the part of those responsible for the distribution of accounts. In this connection, it may be said that the foreman (to whom is often delegated the duty of assigning account numbers to payroll and material records) is not an accountant nor even a bookkeeper, and cannot be expected to be an expert along those lines. However, this condition can certainly be obviated to some extent if he is carefully instructed as to fundamentals, and if he has the opportunity of receiving from the general office advice along those lines. It is clearly the duty of the chief accounting officer of an electric railway to see that the matter of distribution is properly cared for at the source, and if this is accomplished, some of the problems involved in construction accounting will have been solved. In a large corporation this responsibility must necessarily be delegated, and the time of one man, if not more, can be profitably spent on the subject.

Another matter which is of considerable importance (and often of trouble) is the education of those responsible for original records from the field along the subject of proper description of labor performed and of material used. If the work is not described properly, or, as is sometimes the case, not described at all, errors in distribution and inaccurate cost analyses will



W. L. DAVIS

surely follow. This feature may present some practical difficulties, but they can be reduced to a minimum by means of careful and constant supervision on the part of the accounting department.

The educational work should not be confined to the field offices and field supervisory employees but should be extended to every employee of the accounting department as well. The employees in the general office should not be expected to be familiar with physical conditions to any great extent, but they should have a thorough knowledge as to what construction means and should be able to identify charges which are clearly in error and which have been erroneously distributed by someone else.

The direct charges to construction accounts are made up of payroll distributions, material distributions, a proportion of the garage and stable expenses and miscellaneous items through the voucher record. The payroll and material distributions are originated by the construction men in the field, and the accounting department must rely to a great extent upon

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the monthly charges to construction, an amount representing interest upon the money so used, this amount being credited to the interest account. This same procedure could be followed during the time that an operating company is providing for its construction requirements from its own funds pending the sale of bonds, which are usually certified and delivered by the trustee only after construction requirements as outlined in the mortgage have been fulfilled. If it is possible, however, for the company to sell its funded securities covering certain construction work before such work is completed, it may be possible to capitalize the interest thereon (less any interest accretions upon unused construction funds), but care should be taken not to duplicate interest charges. The rate at which the construction interest is taken into the accounts of an electric railway will depend altogether upon the cost of the money during the period of such construction.

Other indirect costs which should be considered are represented by general salaries, general office expense, accounting department expense, purchasing and stores expense, insurance and the like. Although the classification dated July 1, 1914, states that no charge can be made for incidental services, it does permit the carrier to capitalize a proportion of such expense when employees devote a substantial part of their time to construction work. In such cases the company should determine the proper ratio represented by the time of its office employees and should apportion its general expense accordingly, with due regard, however, to any direct charges either to operation or construction which could be eliminated before the allocations were made. The cost of purchasing and the storeroom expenses may be allocated (with due regard for the requirements of the classification) upon the basis of the monthly storeroom issues. In arriving at the basis of such an allocation, however, it might be well to consider any items appearing in the stores distribution which might not be subject to a charge for purchasing and storeroom expense. Insurance may be allocated on a basis which would follow the consideration of the facts involved, but this may present some difficulties. In connection with liability insurance or workmen's compensation insurance, or other insurance based upon payrolls, the premium may be apportioned after analyzing the distributions of the payrolls upon which it is based, and applying the standard or policy rate for construction labor to payrolls representing construction costs. Other indirect or overhead charges should be allocated upon due consideration of the conditions.

HANDLING OF CONSTRUCTION COSTS

While it would be possible to charge construction costs direct to property accounts, it is far more desirable to handle them through the medium of construction authorizations, or, as they

are sometimes called, authorities for expenditures, improvement requisitions, etc. Under these construction authorizations it would be well to issue supplementary work orders covering the charges to each property account, in order to facilitate distribution in the field. These construction authorizations and work orders should be prepared by the engineering department upon recommendation of the department head concerned and should show a complete description of the work to be done, estimate of cost, material on hand, cash required, reasons for expenditures, benefits derived therefrom, and any other information considered necessary or desirable. After being signed by the department head recommending the work and the chief engineer (or someone delegated by him) the work orders should be sent to the accounting department for verification of the distribution. This distribution should be based upon the description as given, and must show not only the approval of the chief accounting officer as to the total charge to construction, but the sub-classification as to property accounts as per the work orders. If a construction authorization describes a job which involves a replacement, a supplementary authority should be prepared and should follow the same course, on the theory that all new work be charged to property account in total, and the value of material retired or replaced in connection therewith be credited to property account in total. Upon receipt of the authority for retirement, the book value of the property should be determined. If this is impossible, an engineer's estimate as to the book value may be used, but his substitution should not be made unless absolutely necessary. If the construction accounts of an electric railway are kept properly, the book value of any plant unit should be available.

The accounting department will assign numbers to the construction authorizations and work orders, but will see that they bear the necessary executive approval before they are returned to the originating department. No construction work should be begun until the authorizations have been properly recorded and approved.

HOW THE WORK IS CONDUCTED

As soon as the work under an authorization is begun, the accounting department will arrange to keep a detailed analysis of its cost. All charges to the authorization must show the number of the work order and the property accounts affected, and will be reflected in the monthly payroll and material distributions accordingly. These distributions should be prepared in such detail as will enable the accounting department to maintain a monthly analysis which may be readily made to parallel the original estimate as reflected by the construction authorizations, and if this analysis is compared with the periodical progress reports usually prepared by the engineer in charge of the job, the charges may

be checked at intervals before the completion of the work.

This analysis should take the form of a subsidiary ledger, controlling a general ledger account, reflecting the total cost construction work in progress, the subsidiary ledger being in balance with the general ledger at all times. The postings to this ledger should reflect as much detail as possible, but it may be difficult to accomplish this result in connection with the payroll and material charges without a detailed distribution. It will be found advantageous to incorporate in the payroll accounting system a method by which the time chargeable to any construction job may be analyzed in detail, and if this is done, it will be possible to reflect in the monthly analysis a complete description of such labor charges. This result may be effected by a columnar form used in the daily distribution of the time tickets with the various charges representing similar work being entered opposite the column showing the necessary descriptive information. A system of this kind would require a separate sheet for the charges to each account during a semi-monthly accounting period. Thus it may appear to involve some extra work, but the value of the monthly analysis of the construction charges will more than offset the additional expense. A similar method may be incorporated in the stores accounting system whereby the charges to each account may be summarized on a daily or monthly recapitulation sheet upon which the quantities of material might be posted opposite the description of each article, the totals being priced and extended at the end of the period. A summary of this kind would not only provide a permanent analysis of the material charges, but would also establish a much easier method of posting the credit side of the stores ledger.

In order to handle construction accounting properly in the general office, it is absolutely necessary that these monthly analyses be kept up to date. They should not only reflect the details of all direct charges, but they should also contain such proportions of the indirect charges as may be applicable to them, these entry charges being applied monthly. A simple method of allocating the indirect charges to the various work orders may be established by means of a separate construction authorization to which all indirect or overhead items should be charged during the month, this authorization to be cleared before the construction accounts are closed and the total thereof divided among the various work orders upon the basis of the direct charges thereto (with due regard for such conditions as may arise in connection with any work orders as would be chargeable with any specific indirect cost item). The greater portion of the indirect charges represent credits to various items in the operating expenses and fixed charges, and if such items are not credited to the income account

and charged to construction regularly, a distortion of the former is sure to result.

As soon as the work in connection with an authorization is completed, the accounting department must be notified and steps should be taken to secure all outstanding bills pertaining to the job and enter them promptly. As soon as it is determined that all of the charges have been entered, the accounting department will prepare a cost analysis of the work and submit it to the engineering department for comparison with the physical data and the original estimate. If the final cost exceeds the original estimate, a supplementary authorization covering the difference must be prepared by the engineering department and sent to the executive department for approval before final entries are made to property accounts. When the cost analysis is finally agreed upon by the department head concerned, the cost of the work should be transferred from the "Work in Progress" account to the plant account.

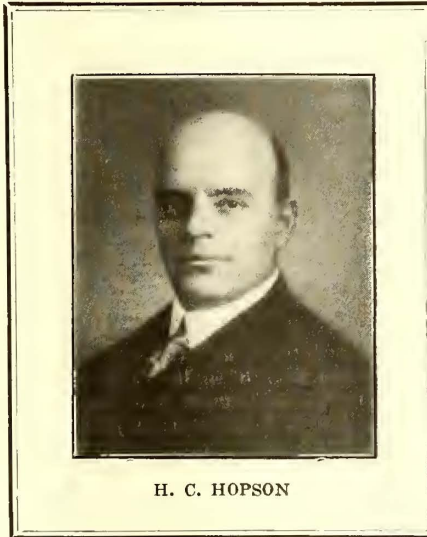
The routine work in connection with an authority for retirement should be handled in a somewhat different manner. As soon as the accounting department determines the original (or estimated) book value the authorization should be sent to the executive department for approval, and then returned to the accounting department, where copies should be made and sent to the various departments concerned. The accounting department should assign a number to the retirement authorization, and should debit a special account under the construction authorization (offsetting the depreciation reserve) with the full amount of the book value, crediting it to plant account as soon as the property is taken out of service (this information being furnished by the department head responsible for the work), the cost of any work incidental to the removal of the plant material having been charged to the special account in the meantime. After the final disposition of the property, the amount realized should be credited to the special account and the difference charged to the depreciation reserve. If the depreciation reserve has been set up on the basis of the estimated depreciation of each property unit, and the difference between the plant value and the salvage value of the property retired be over or under the amount set aside for it, the balance would be properly applicable to operating expenses. This method is recommended in order to provide for a credit entry to plant account before the property retired has been sold or otherwise disposed of.

If the construction accounting records are kept up to date, and the monthly analyses compared with the progress reports made by the engineers performing the work, monthly summaries of the charges to the various construction jobs may be made to determine the cash requirements of the corporation.

Adaptation of Routine Accounting Results to Particular Uses*

Routine Accounting with a View to Obtaining Actual Instead of General Results Provides the Basis for Furnishing Cost Figures Pertaining to Construction or Operation

By H. C. HOPSON, C. P. A.
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H. C. HOPSON

NOT so many years ago, street railway accounting, in fact all public utility accounting, was comparatively simple. It was accomplished with a limited force and required little beyond a knowledge of sound bookkeeping principles. Usually the rate of fare was fixed by franchise or by a specific statute and was seldom if ever changed. The properties were usually small and self-contained, and the practical operating man prided himself upon his ability to know all about the property by watching the people ride on the cars, maintaining constant contact with his employees, ascertaining how much cash there was in the bank from time to time, and giving the statement of receipts and disbursements a cursory examination "some time after" the close of the month. This "some time after" used to range from two weeks to three months depending upon the willingness of the accountant to put in extra time at night after he had finished checking and accounting for collections, counting transfers, making up payrolls, etc., which constituted his duties.

The type of accountant needed today in the public utility industry is a man capable of acting as a general business adviser who can stand on an equal footing with the lawyers, engineers and other technical men in the organizations. To be all that he ought to be and in order to be able to claim this standing in the organization, an accountant must be equipped to furnish the various kinds of information needed and to furnish it on short notice. I could not hope to set forth in detail all of the different kinds of records

which a public utility accountant might keep to meet particular needs but will only attempt to cover some of the more general conditions which exist, not with a view toward urging the addition of any system blindly but instead in order that the suggested group of examples given may serve as a stimulus to constructive thought as to the instances where the idea involved in this paper, rather than the substance of it, may be made effective.

ROUTINE ACCOUNTING FUNDAMENTALS

Before dealing with particularities, there is a fundamental which should first be emphasized. Unless routine accounting is laid out on a sufficiently comprehensive scale you cannot, regardless of the time and money available, meet many particular needs. To illustrate: the time when you must prepare to furnish information as to the cost of particular service is from day to day, as the distribution is put on the vouchers or material issues. If this is not done, the only basis for the distribution of such costs in a few months is the recollection of those who approved them. Such a basis is of course entirely unsatisfactory, emanating from a department which is supposed to deal with provable facts. Having this in mind, it is well to say that the first and most important fundamental is that certain basic principles for the classification of items must be laid out and kept day by day.

A second point, is that so far as possible the routine accounting results which are summarized in the current monthly statement should be kept in such form that they will require as little restatement as possible. To illustrate: we all know that taxes, except possibly income taxes—and they ought to be—are treated the same as are operating expenses for purposes of testing the adequacy of rates. Yet, on the income statement for some street railways taxes are shown as an income deduction along with bond interest and to determine the amount of the remaining revenue available for a return upon the capital investment it is necessary to make a deduction. The statement might as well have treated taxes as a revenue deduction, as is customary, so as to show at a glance the amount available for return.

Similarly, we all know that the amount of the allowance for renewals and replacements frequently varies, being an item which is very largely dependent upon judgment, method of computation and other circumstances. Hence, in the comparative statements which we ordinarily set up, the amount

*Abstract of paper presented at the annual convention of the American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 3-5, 1921.

included in operating expenses in one accounting period may be radically different from that in the other accounting period with which the comparison is made, thereby entirely destroying the comparison. As a general thing such reports must be taken from your books, yet it is impossible, if the best use of the routine accounting results is to be had, that in each particular instance the books should be examined to ascertain the fact, and perhaps the man who is attempting to make use of the statement has neither the time nor the knowledge of the intricacies of the reports to be able to assemble together all of the so-called depreciation items in order that he may ascertain the fact for himself. Hence, to get the best use of the routine accounting result for the particular purpose, an income account comparison should show on the same page in a convenient place the relative amounts included for renewals and replacements in the respective accounting periods. This saves time and makes the statement much more usable.

INVENTORY VS. PROJECT CLASSIFICATION

There is another general observation with respect to harmonizing particular requirements with routine accounting. After the receipts and disbursements stage was passed, some effort was made to segregate current expenditures between capital and income but usually at the beginning all the capital charges were lumped into a single account. This lumping into a single account, however, did not suit anyone. It cast suspicion upon the legitimacy upon the whole capital account, and other than showing that the total charges, made in a particular period, were a given amount, it meant nothing. The engineer wanted to know how much a particular extension cost. The master mechanic wanted to know how much a lot of cars cost, or more difficult still, to know the cost of putting a new type of brake on a particular car or group of cars. The banker cared nothing about these details but wished to know the amount which was expended for rails, ties, ballast and paving, etc., or perhaps in less detail, the amount expended for track, rolling stock and power supply. The executive, being interested both in specific projects and also in group expenditures, wished information as to both.

The conflict between the advocate of the inventory classification and the project or job classification led in many cases merely to an unsatisfactory compromise so that it was not unusual to find on the balance sheet, representing work long since completed, expenditures of the same nature carried under both inventory and project nomenclature. Subsequently, with the advent of regulatory commissions, requirements were made enforcing the inventory classification. This led, in some cases to a complete abandonment of any routine accounting on the job basis, with the result that engineers and master

mechanics attempted to inaugurate their own subsidiary clerical or accounting departments, which purported to keep so called cost records. This practice has been a bugaboo wherever it has appeared because of the many items of cost which they failed to include on account of the necessarily incomplete sources of information from which they were derived. This was and is entirely unnecessary. Such records can and should be kept in the accounting department without materially increased work if the work is initially laid out on the right basis.

The inventory or commission classification is known to all. It should be in the hands of every employee of the company who authorizes work or approves vouchers or material slips. This, therefore, is taken care of. For a project classification every well-regulated, economically conducted corporate enterprise today has a budget with systematically arranged authorizations, jobs or projects, known by ordinary numbers or decimal designations. The accounting department should have the key or master list and make it its business to see that all departments of the company, having to do with these matters, are advised of all existing authorizations, to the end that as expenditures are made, in addition to carrying distribution showing the proper commission classification account, they should also carry the appropriate project number.

AUXILIARY PROJECT RECORD

The results of the recorded distributions on the individual vouchers and material slips when assembled may be either kept for the time being in a construction work in progress account or debited direct to the appropriate road and equipment accounts, being distributed by journal entry at the conclusion of the work, or, as I prefer, "second posted" into an auxiliary project record which is in continuous balance with the net increase in the road and equipment account in the general ledger. The uses to which such data may be put are manifold.

There has been a great deal of argument between commissions and courts of late as to whether present value or original cost should be the proper basis for rate making. While this is a very important question a great many street railways would even now be very much pleased if they could have a recognized fair return upon their original cost and leave present value for the future. The great difficulty, however, is that the original cost of much of their property is subject to fully as much speculation as is claimed with respect to the estimates of their engineers. In such a case even if all the records are available, it requires perhaps a month to analyze the cost of the respective cars so that a simple list can be furnished giving merely car number and amount. I know of no means which affords as accurate a check upon a perpetual inventory, which is practically a neces-

sity in any public utility where costs are made use of, than properly kept routine capital records.

THE ACCOUNTANT SHOULD LOOK INTO THE FUTURE

One of the elements most vital to the financial health of a public utility is an adequate structure of rates. Except in rare instances, however, adequate rates are only secured at a vast outlay of money and labor and in the face of what is sometimes very difficult and involved litigation. Sometimes this litigation and the studies attendant upon progressing it, consume so much time that the credit of a corporation is seriously impaired before relief is secured. Therefore, one of the first duties of the accountant should be to grasp in a broad way and set before his executive officers the need for additional revenue before such need becomes acute. This need for revenue may be on a system as a whole or merely on one of its parts. If the accountant is to be the business adviser a detailed study of revenue and cost trends should enable him to anticipate the net results from operation from three to six months in advance.

Assuming for a moment that the accountant has demonstrated that with the existing rate of fare the revenues will be insufficient to provide the requisite fair return, it becomes necessary to collate data in such a way as to sell the idea to the regulating authority. In this, the importance of the work of the accountant cannot be regarded too highly. To have its maximum value and effect before a regulatory body, it should be exact and correct. The psychology of rate litigations is such that there is a great deal of magic in the word "actual." For an accountant to state on the witness stand that the results which he is presenting are actual, frequently produces a distinct sense of relief and sympathetic consideration on the part of the judicial officer who is hearing the case. In view of this, the keeping of records upon an actual basis is not only highly desirable, but is apt at any time to be worth a great many more dollars than are expended upon it.

Most public utility accountants have considerable experience and training in the keeping of revenue records upon an actual basis and little need be said on this subject. There doubtless are instances however where an advantage can be gained by devoting a little attention to the subject of a better arrangement for the keeping of revenue records by geographical subdivisions of the property or by such natural subdivisions as suggest themselves in the light of possible revisions in tariff structures. In given cases where it is not, methods may be adopted whereby revenues collected on interurban cars within the confines of cities and fares collected on suburban runs by cars which also operate on city lines, might be devised and made effective use of.

In connection with operating ex-

penses, there is even greater opportunity for the effective use of actual results than in the case of revenue. Public utility commissioners and judges who hear cases of this character cannot but be impressed when evidence of operating costs is presented from the standpoint of actual outlay, especially if they have been listening to a good deal of testimony upon so-called allocations of expense on a per car mile or other basis. There will always be some expenses of a general character which must be allocated upon a more or less arbitrary basis, but it is frequently possible to isolate certain expenses of this sort so that the element of approximation will enter to a lesser degree than it would otherwise. Where operating costs as a whole are arbitrarily divided by car miles, car hours or any other of the generally utilized media for allocation, it almost inevitably follows that one branch or the other of the company's business suffers and not only does it suffer in fact, but in a controversy in which so-called facts thus arrived at were severely disputed, a whole case might suffer even more. In the following I will refer to some of the things which may be done to obviate this condition.

THE JOB ORDER SYSTEM FOR ALLOCATION OF EXPENSE

It is possible without tremendous effort to keep all of the maintenance of way expenses upon an actual basis through the adoption of the job order system which would cover all maintenance work in a given district for each year. Where this simple method is adopted, no allocation of direct maintenance of way expenses whatever is necessary except, possibly, the time devoted to superintendence, which is small in relation to the aggregate.

In the case of maintenance of equipment expenses, subdivisions are frequently kept, usually by car units. These can be tied into the respective classes of service and districts from a knowledge of the equipment units utilized. Further attention to this feature cannot help but develop means by which even more exact segregations can be made.

Power expenses are frequently apportioned upon an arbitrary basis and the best that can be said for some of these allocations is that they might be right. A careful study of this situation will disclose, in some cases, that the location of the company's transmission or distribution lines was such that it would be possible to measure the amount of current utilized in the operation of each of the property's major subdivisions.

The most frequent method of allocation employed in connection with transportation expenses is a subdivision on a car hour basis. As regards wages of motormen and conductors, this method of allocation is probably better than any other, the only possible criticism being that it might not accomplish a correct allocation of the amount paid for extra time. There are many expenses

in the transportation group, however, where exact results are not secured if only this car hour basis is used.

Traffic expenses are usually of minor importance and need not be referred to specifically.

The element of joint cost is more present in the group of expenses coming under the head of "General" than elsewhere. This is not true, however, of all of the general expenses. On many properties officers whose compensation is chargeable under the general group, have specific duties which they perform in connection with separate parts of the property. This is particularly true of many of the clerks. Most of the clerical compensation is charged to General Expenses. Of course if some effort is not made, a little care used, legal services may come in in the form of a lump sum bill once in a year, with no satisfactory segregation. When the importance of being able to assign actual costs to the particular services becomes clear to the legal advisers it is possible to get a reasonably satisfactory segregation of bills.

Insurance, particularly insurance against property damage, can be readily segregated where there has been a valuation of the property. Injuries and damages almost always can be separated. In fact the surprising thing about these so-called joint costs is that while when first surveyed they seem to be almost all joint, upon analysis of the individual items, a sound logical basis for allocation of many of them becomes apparent to even junior clerks to whom cost accounting is a stranger.

Taxes usually fall into two general classifications, those relating to a specific property and those levied upon the corporation's rights to do business as a whole or upon the results of its operations as a whole. The taxes levied upon specific items of property can usually be allocated directly to the services to which those properties are devoted. Even taxes of a more general character can usually be subdivided upon some basis of fact and even if they cannot be exactly subdivided, they certainly can be allocated upon a more correct basis than would otherwise be the case if a correct statement of fact as to the company's situation and income (for each of the company's respective parts) has been maintained.

SEGREGATION OF PLANT ACCOUNTS IS ESSENTIAL

In addition to the necessity for keeping operating results in such a manner as to record actual rather than estimated facts very real advantage can be secured by a proper segregation of the plant or fixed capital account. The ideal arrangement would be where the fixed capital investment in each zone was carried separately and could be set forth on short notice. (The word zone here used is intended to mean any natural subdivision of the property for which a separate fare might need to be established.)

In most rate proceedings, two ele-

ments in connection with the physical property are usually considered. One is the actual cost or investment, and this is peculiarly within the province of the accountant to demonstrate. The ascertainment of the value of the property usually falls to the lot of the engineer. Experience has demonstrated that the accountant with his set of well kept records showing actual costs of actual property can be of inestimable value to the engineer in aiding him to ascertain the property's value.

While all the foregoing matters have their definite place and value in rate proceedings, the use of these data is by no means limited to proceedings of this kind. They can be made to locate operating efficiency or inefficiency and the causes responsible for either. They can also be utilized effectively in instances where unwarranted demands are made for additional service, where it is desired to postpone burdensome street repairing or repaving requirements, where prospective or existing jitney competition must be met, in instances where there is public clamor for extensions which are bound to prove unprofitable and in other instances too numerous to mention.

COST ACCOUNTING WILL GIVE THE BEST RESULTS

To accomplish the best results, the street railway accountant should always seek the unit and maintain his records so that the function and relation of the unit to the whole can be ascertained. This suggestion savors of cost accounting but that is one of the more recent developments of street railway accounting. The unit to be used, whether it be the line, the zone, the division, the type of track, the car or the repair part, should be carefully selected with a view toward the present and future requirement of the particular property involved and its problems. After the unit has been selected, it should be adhered to with reasonable consistency. It is only in this way and through the use of comparative units and periods that the best results can be secured. To do the most effective work along these lines, the accountant should be in complete control of the accounting situation, subject only to executive direction.

Regulation has its faults, but it also has its advantages, and not the least of these is that it has taught the sponsors for and participants in the electric railway industry that this industry is a business and a very real and essential business. The successful operation of a successful business contemplates that at the end of each operating period there will be left an adequate amount of wages for the dollars which were employed in producing the service which was furnished. Here lies a duty which devolves particularly on the street railway accountant who should do his utmost to insure that this net income will exist and will continue to exist. He is not only the watch dog for the company's receipts, but should also be the critic of its expenses.

Utility Commissioners Urge Improved Methods in Electric Interurban Operation

National Association of Commissioners Opposes Government Ownership and Discusses Safety Methods on Interurban Electric Railways and Post-War Regulatory Problems

THIRTY-TWO states were represented at the opening session of the annual meeting of the National Association of Railway and Utility Commissioners, held in Atlanta, Ga., on Tuesday to Friday of this week. James A. Perry, president of the association, vigorously opposed centralization in Washington, in the Interstate Commerce Commission, of control over all railroad rates, thereby destroying the power of the states to regulate their domestic commerce. In discussing the local problems of utilities, such as electric light, street railway and gas companies, Commissioner Perry asserted that the rates have been too low, generally speaking, throughout the country for the past two years, and he predicted that a continuance of this policy of dealing with local utilities will very soon drive capital entirely away from utility investments, if, indeed, it has not to a large extent already done so.

PUBLIC SHOULD REALIZE UTILITY SITUATION

The time has come, declared Commissioner Perry, for the public to realize that it is equally interested with utility stockholders in adequate service and adequate returns upon the value of the properties devoted to the public use. It is time for the public to realize that community growth is dependent upon utility growth, and that utility growth is dependent upon the investment of capital, and that investors of capital will not put their money into utility property when utilities are not allowed to earn as much as the legal rate of interest in the states where they operate.

Public or government ownership was strongly opposed in the report of the public ownership and operation committee, and after an exhaustive inquiry into matters concerning government and private ownership, both in the United States and abroad, it went on record as favoring privately owned and privately operated public utilities, with the proviso that all utilities should have public regulation.

"Such regulatory governmental bodies, however," the report said, "must be sufficiently wise and fair and far-seeing to stand between the utility in question and unthinking, hasty public clamor not based upon full knowledge and careful thought. They must operate successfully in order successfully and adequately to fulfill their duty of service to the public.

"It therefore follows that, in order to maintain a just, equitable balance, and even to keep such utilities out of bankruptcy, it is necessary to maintain their higher rates longer than would to the layman seem necessary judging by the surrounding decline in commodity prices. To follow any other policy would be to put such utilities out of business and to discontinue that service to which the public is so justly entitled and which is now more necessary to the return of the vast bulk of private business to the desired goal of normalcy."

Improved safety methods in the oper-

ation of interurban electric railway lines were strongly urged by the committee on safety of railroad operation, whose report was devoted to a discussion of interurban electric lines.

As pointed out by the committee, the interurban electric lines have become important factors in the transportation system of the country, but "there has not been adequate advancement or improvement in operating methods or practices, with the result that many such systems, particularly trunk-line railroads, are today operating under primitive street railway rules and regulations which constitute a serious menace to life and property."

SAFETY METHODS RECOMMENDED

As the first requisite of safety on interurban electric lines, the committee recommended the adoption of timetables and the strict requirement that motormen and conductors learn them thoroughly; next, that the double-order system of dispatching trains be put in effect on all important lines, this system consisting in the issuance of all train orders in writing and in duplicate, one copy going on the dispatcher's file and one being delivered to the crew.

The committee recommended that the block system be required on all electric roads where two or more trains are operated simultaneously, indorsed very highly the use of platform doors, preventing the ingress and egress of passengers until cars have come to a full stop, and particularly stressed the importance of careful selection, training, supervision and probation of motormen and conductors.

PROBLEMS OF REGULATION DISCUSSED

Wednesday afternoon was devoted to a round-table discussion on after-the-war phases of regulation, presided over by Henry G. Wells of the Massachusetts commission. In opening the discussion he pointed out that regulation should not penalize efficiency and place a premium on inefficiency. He referred to financing of utilities as one of the great problems and related how a solution was brought about in his state by adequate legislation. Other commissioners dwelt on the need of fairness and truthfulness in presenting cases to them in order to inspire confidence in the basis for the argument of the utility. Customer-ownership companies were viewed with much favor by commissioners and considered to afford a solution to a part of the financing problem. They urged that harmony be sought by every method.

On Wednesday evening a banquet was tendered the association by the Presidents' Club of Atlanta, which is a club comprising presidents of some fifty-two civic bodies. Mell R. Wilkinson was toastmaster, and addresses were made

by prominent business men, including Carl D. Jackson, president-elect, and James A. Perry, retiring president of the association; Hartford Powel, editor of *Collier's Weekly*, and Joseph B. Eastman of the Interstate Commerce Commission. Arrangements for the banquet and other entertainment features were carried out by J. Prince Webster, formerly a member of the Georgia Railroad Commission.

Thursday's and Friday's proceedings will be reported in a later issue of the **ELECTRIC RAILWAY JOURNAL**.

Conference on Railroad Ties

A CONFERENCE on railroad cross ties and switch ties is to be held on Tuesday, Oct. 25, 1921, at 11 a.m., in Room 206, Atlantic Building, 928 F Street, N. W., Washington, D. C. The purpose of the conference is to decide:

1. Whether the unification of specifications for railroad cross ties and switch ties shall be undertaken.

2. If so, what the scope of the work shall be.

3. How the work shall be organized.

The details of existing specifications will be discussed in order to develop the lines along which the committee organized to carry on the work will consider the problem under the various local conditions.

This conference has been called in accordance with requests received by the American Engineering Standards Committee from the American Railway Engineering Association and the Forest Service of the United States Department of Agriculture for a conference of the bodies interested to determine the desirability of undertaking the standardization of a specification for railroad cross ties and a specification for railroad switch ties. In connection with its request for the conference the Forest Service made the following statements: "The railroads of this country use in the neighborhood of 100,000,000 ties per year. Before the war there was a wide variation in specifications. Much was accomplished toward standardization during the war, and since then further progress has been made. The American Railway Engineering Association and the National Association of Railroad Tie Producers have both adopted standard grades for railroad ties. The Forest Service is, of course, interested from the standpoint of conservation, as well as from that of standardization of forest products."

Invitations have been sent to the following national organizations: American Electric Railway Association, American Railway Engineering Association, American Society of Civil Engineers, American Society for Testing Materials, Forest Service, United States Department of Agriculture, Hardwood Manufacturers' Association of the United States, National Association of Railroad Tie Producers, National Hardwood Lumber Association and National Lumber Manufacturers' Association.

News of the Electric Railways

FINANCIAL AND CORPORATE :: TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Des Moines Franchise Presented

Measure Looking to New Deal Provides for Sliding Return and Graduated Fares

Negotiations looking toward the end of the Des Moines railway controversy received a serious set back during the week ended Oct. 15 through failure of the owners of the Des Moines City Railway and the McKinley interests to arrive at an agreement relative to the power clause contained in the proposed railway franchise. Local officials of the Des Moines Electric Company, which is owned by McKinley interests, announced that inclusion of a power clause in any new grant to the railway would mean increased electric rates in Des Moines. They opposed the inclusion of the clause in the grant.

Members of the City Council sided with the McKinley representatives and at the session of the Council on Oct. 10 passed a resolution instructing the Corporation Counsel to notify the railway receivers that the power clause must be eliminated. The Mayor and members of the Council declared that the section as to whether the Des Moines City Railway is to be empowered to sell light and power should be submitted to people separately from the franchise. However, when the final draft of the franchise was presented on Oct. 12 the power clause remained.

M. H. McLean, representing the Harris interests controlling the Des Moines City Railway issued a statement on Oct. 12 to the effect that the company's reason for desiring the power clause was that the rate of fares may be reduced through the profit from the sale of surplus power. He called attention to the fact that the franchise would not permit earnings on the common stock until the fare had been reduced.

Mr. McLean further stated that in the past the railway had received applications for the purchase of power from it and that the company desired to take advantage of the legitimate demands which exist. He emphasized the fact that the Harris Company did not want to engage in the light and power business in competition with the McKinley interests. He also stated that unless his company was permitted to use its full facilities it could not be compelled to put new money into the property.

The final draft of the franchise, which has been pronounced acceptable by Harris interests, was presented to the Council on Oct. 12, but no definite action was taken. There are few changes from the draft as it stood after Corporation Counsel Miller's original alterations. A new motor bus clause bars the buses only from streets on which

railway lines are operated. Buses are permitted to cross car line streets at right angles, to cross bridges with car lines and to have down-town terminals. Arbitration of labor troubles is to be by a board of three members of the State Railroad Commission or by three judges from outside Des Moines chosen by the Chief Justice of the Supreme Court.

The grant provides for the operation of one-man cars on certain lines and makes possible one-man cars on all lines at certain hours. The clause requiring city car supervisors to be graduate engineers has been eliminated.

An initial fare of 8 cents is provided, with no return on the common stock until the fare is reduced to 7 cents. The allowance provided is for a 3 per cent return to the company on a 7-cent fare, 4½ per cent on a 6-cent fare, 6 per cent on 5-cent fare.

The Council at its meeting on Oct. 12 ordered the Corporation Counsel to petition Judge Wade to order immediate resumption of service and by vote of four to one defeated resolutions offering a three-year bus franchise.

Sentiment is steadily crystalizing in favor of the return of the electric railway cars. Ten Connecticut buses left the city last week and the number of buses now operating in the city is under 100.

Wants Ten-Year Bus Franchise in Saginaw

A conference was held on Oct. 12 attended by George R. Bidwell, New York, president of the Trackless Transportation Corporation, members of the Council of Saginaw, Mich., and the Board of Commerce Committee relative to organizing bus lines in Saginaw. To show an 8 per cent return on the investment, in addition to a suitable sinking fund it would be necessary to charge an 8-cent fare. The plan is to sell half the \$500,000 stock in Saginaw, Mr. Bidwell's company to subscribe the balance.

The cost of operating thirty-five buses figured on the car-mile basis of the Saginaw-Bay City Railway, now in hands of a receiver, would be 28½ cents a bus mile. Mr. Bidwell's company could not attempt to finance a local company in Saginaw unless it was assured an exclusive privilege.

Mr. Bidwell after making survey of Saginaw and studying the conditions under which the Saginaw-Bay City Railway was compelled to operate did not express surprise that the local company had gone into the hands of a receiver. In order to go ahead Mr. Bidwell would have to be assured of a 10-year franchise and the elimination of all competition.

Pacific Electric and Los Angeles Railways Announce Cut of Four Cents an Hour

Wages of trainmen on the Pacific Electric Railway Lines were reduced four cents an hour, effective Oct. 1, 1921. This cut is made up of 2½ cents an hour in rates of pay and 1½ cents additional through discontinuance of the \$5 a month bonus paid trainmen for a clear record. Under the new wage schedule trainmen will receive one cent more an hour than the wage prior to Aug. 16, 1920, as the last increase was 5 cents an hour.

The present annual vacation and transportation arrangements will be maintained, whereas after one year's service annual vacation of 12 days each year with pay is allowable, as well as certain transportation privileges as covered by the company's circulars of Dec. 17, 1918, and June 20, 1919. The Pacific Electric Lines are among the last of large employers of labor in Los Angeles to make reductions in pay and the cut has been made reluctantly to correspond with previous readjustments of hours and pay in other departments.

In comparison with other California lines the wages on the Market Street Railway Lines in San Francisco were reduced 4 cents an hour in August; 6 cents on the Oakland Traction and Key Route Lines in July. The old and new rates of pay in cents per hour on the Pacific Electric Lines are as follows:

Street Car Service	Rate	
	Old	New
First year.....	50	46
Second year.....	51	48½
Third year.....	52	49½
Fourth year and thereafter.....	53	50½
Interurban Service		
First year.....	52½	48½
Second year.....	53½	51
Third year.....	54½	52
Fourth year and thereafter.....	55½	53
Single Track Line		
First year.....	55	51
Second year.....	56	53½
Third year.....	57	54½
Fourth year.....	58	55½
Freight and Work Train Service		
Flat Rate		
Motormen and conductors.....	62	60
Trainmen and switchmen.....	57	54
Trolley-men.....	52	49
Yard foremen.....	62	60

Announcement of a reduction of 4 cents an hour it is reported was received with little protest by the Los Angeles Railway trainmen, while the trainmen of the Pacific Electric Lines, it is said, took the news in the same spirit since rumors had been afloat for some time that the company's financial status, owing to motor bus competition, might make a reduction in wages necessary at any time.

In connection with the Los Angeles Railway's new scale of wages the merit system and bonus, amounting to about 2 cents an hour, will continue in force.

Proposal Renewed to Handle Freight in New York Subways

Freight transportation in the New York subways during the early morning hours, to increase earnings and help keep the fare at 5 cents, has been proposed by the Transit Commission to the Port Authority controlling harbor transportation, of which Alfred E. Smith, Lewis H. Pounds and E. H. Outerbridge are the New York members.

The Transit Commission's engineers, it was announced, are working out a plan for handling freight trains in the subway between 1 and 5 a. m. to transfer freight between terminals in Manhattan, the Bronx and Brooklyn, thereby earning a large profit during a period in which the subway trains now do not pay for their operation.

It was announced by the Transit Commission representatives that this proposal does not aim at any interference with the Port Authority's plans for organizing freight handling for the whole harbor, but is to be directed toward supplementing the harbor freight system with highly effective freight distribution on this side of the Hudson. The new terminals to link the subway with the railway freight systems, they said, would quickly be paid for out of the profits of operation of freight trains in the subways.

Another Commissioner for City Participation in Utility Ownership

William A. Prendergast, chairman of the New York Public Service Commission, whose opinion in the Utica fare case attracted state-wide attention, emphasized the need for immediate city participation in utility affairs and ultimate municipal ownership in a speech which he made before the Empire State Gas & Electric Association at its meeting at Lake Placid on Oct. 7. In his address Mr. Prendergast said:

The time has arrived for some constructive effort to correct present conditions. There is no use in permitting their continuance. If this is attempted, public disfavor will exhibit itself in demands for more drastic remedies. The principle of municipal operation has its main support in a desire for a change, rather than in any inherent belief in the efficacy of the principle itself.

I am suggesting a working partnership between a unified gas corporation and the city. There are precedents for this. It is not a new experiment. The exact basis for this partnership I am not prepared to discuss definitely at this time, but will say that in the recommendations of the surpassingly able report of the Transit Commission issued on September 30 there is considerable suggestive matter that would apply to the gas company situation. On one point however, I wish to be absolutely specific at this time and say that the City of New York must have a positive voice and representation in the management of such an enterprise. Legislative sanction would be required and this, I feel assured, could be obtained.

I am not suggesting municipal operation. On the contrary, I would deprecate it. For the city to have representation in an enterprise is one thing. For a city government to have the responsibility of conducting a great and intricate business is quite another. The political changes that take place in a city government absolutely preclude the possibility of successful municipal operation. Further, the city could not buy

the companies outright, for it has not the credit for such a gigantic operation.

According to Mr. Prendergast the New York city public is "strongly critical, suspicious and unfriendly" toward practically all public utilities, and in suggesting the creation of the gas consolidation he emphasized that only "the genuine value of the present great investment in the gas business need be protected" in consideration of his ideas.

Municipal Tangle Discussed

Nothing Tangible Will Be Accomplished While Company and Council Fight

Unless the Minneapolis Street Railway can have the confidence and co-operation of the City Council in its efforts to provide better service for the people of the city nothing will be accomplished and car riders will be the sufferers. This opinion was recently expressed by Horace Lowry, president Minneapolis Street Railway, to the Council's special committee on street railway matters and road extensions.

Mr. Lowry in commenting on the activities of the company during the current year said that \$528,700 had been spent in improvements though the revenue had decreased. He alluded to the city's opposition to the Railroad & Warehouse Commission in authorizing a 7-cent fare with four tickets for 25 cents and said that the city took the stand that the company would not be required to make further paving or extensions this year, yet a few days later a mandamus action was begun by the city to force the company to pave Johnson Street northeast.

In his plea for co-operation Mr. Lowry said in part:

The company wants an opportunity to show the members of the City Council and the Mayor what it is trying to do. The company is on its toes and ready to provide the best of service that its revenues will permit. It is now providing the best service at lowest cost of any city in the United States, and I challenge anyone to dispute this fact.

The company wants to establish good credit. It cannot get credit now. The company will have to pay 8 per cent to renew its mortgage bonds due January 1.

To show what we are doing, and attempting to do, we invite the members of Council and the Mayor to visit our shops, take lunch, and after inspection there, make a tour of the system in one of our new double-unit cars. We want your confidence and co-operation in aiding us to get enough money to maintain good service, and establish proper credit.

The committee voted unanimously to accept Mr. Lowry's invitation.

Outlook Good for Reorganized Lines

The committees which have been soliciting subscriptions to the stock of the new Brunswick & Interurban Railway, Brunswick, Ga., report that much progress has been made and they are confident that they will secure sufficient funds for the operation of the line. The Brunswick & Interurban Railway is the successor company to the City & Suburban Railway. Reference was made to the reorganization of the property in the ELECTRIC RAILWAY JOURNAL, issue of Sept. 17.

Trolley Bus an Evolution, Not Revolution

Thomas S. Wheelwright, president of the Virginia Railway & Power Company, Richmond, Va., recently issued a statement designed to refute some erroneous thinking about the place of the trackless trolley or trolley bus and its relation to the present electric railway system. As a certain amount of this kind of talk is passing around in the industry as well as among laymen, the following extracts from the statement should be considered.

Mr. Wheelwright points out that since July 1 successful demonstrations of the trackless trolley have been made in Richmond and Norfolk, Va., in the smooth-paved residential districts, where the right to operate noisy track lines had been denied. During the demonstrations, the public as well as public officials of these two cities were most generous in their approval of this new method of transportation. In their references to the new trolley bus many of its enthusiasts have carelessly remarked that it is a revolution of the present street railway system, which is all wrong. It is an evolution, not a revolution, Mr. Wheelwright emphasizes. The trackless trolley is a means for the development of the present street railway system whereby transportation service can be made to grow and expand with the development of the community. The use of the term "revolution" in connection with the trolley bus has already fixed in the minds of some the idea that the present street railway system is to be discarded and the tracks torn up and trolley buses substituted for street cars.

Mr. Wheelwright points out that neither Richmond nor Norfolk nor any other city is much concerned about changing the mode of its transportation where it already exists. What should concern every growing community is how to keep the transportation lines it already has and how to get service into those sections not now served. The evolution of street paving from cobblestones to Belgian block, to asphalt and concrete, has suggested a type of transportation vehicle that will be in keeping with the quiet and comfort of the new smooth paving. This has brought the trolley bus, which is especially designed for operation in those smooth-paved sections where regular transportation service is not now available. Its function will be to reach out into the unserved sections.

Thus the trolley bus is an evolution or development, not a revolution or overthrow. It is a means by which the electric trolley can be made a greater factor in community growth of the future than it ever has been in the past.

Men Accept Cut. — Employees of the Springfield (Ohio) Railway have voted to accept a wage scale of 42, 44 and 46 cents an hour. The former pay was 53, 55 and 57 cents. The cut became effective Oct. 1.

Suggests Subway for Montreal

The plan and route for an underground railway in Montreal, Can., have been outlined by F. S. Williamson, prominent engineer, whose paper on subways read recently at the Town Planning Convention, has caused considerable comment.

In Mr. Williamson's opinion a subway system in Montreal would cost about \$25,000,000. It should be operated by the Montreal Tramways. With such a system in force transportation carriers in Montreal could handle 300,000,000 passengers a year.

Wage Cut Accepted "Under Protest"

A 12 per cent wage reduction ordered by the Omaha & Council Bluffs Street Railway, Omaha, Neb., has been accepted by the union "under protest." The reduction was 7 cents an hour. The old scale was 53 cents an hour for first three months of service, 55 cents for next nine months, and 57 cents after the first year of service. The new scale is 46, 48 and 50 cents an hour, respectively, for the periods mentioned.

The men voted three to one against taking a strike referendum of the union. Anton Rubeck, president of local union No. 807, stated that the men adopted the right course when they voted against taking a strike vote and accepted the decrease of wages.

The action of the company in reducing the wages was in line with a recent recommendation of the Nebraska Street Railway Commission, which denied the company's application for an 8-cent rate, with a special ticket rate. The wage reduction has been extended to all branches of the company's service. J. A. Munro, vice-president, accepted a cut of 25 per cent in salary, and the chairman of the board of directors was similarly reduced.

The saving in wages under the reduction will amount to nearly \$200,000 a year.

Trainmen—Take Heed

George J. Plummer, superintendent of transportation for the Dallas (Tex.) Railway, has contributed "Transportation Department Hints" in the last issue of "Partners," the semi-monthly organ published by the traction company. In part they are as follows:

I want better service for myself and for the public. I am not unselfish in this, for better service will result in increased car riders, and increased car riders will mean increased car revenue. Bear in mind that an increase or decrease in revenues will affect your condition.

Do your duty by everyone and when the day comes to a close you can spend the evening at home with the folks in content. Violate the rules, circulate grouch, and things won't be pleasant at home nor here. You may have your likes and dislikes; leave your dislikes at home, for there is nothing to be gained by bringing them on the job.

Every patron on our lines stands on an equal in the service you are to give. That service is gauged only by the passenger's every need; if lame, aged, or child, it is service to assist them on and off the cars, to a seat, and to a safe place on the curb.

Representing the company you will understand that cleanliness in person, appearance, language and mind is most essential.

A motorman who starts and stops his car with a jerk has no friends among the passengers or conductors. He makes life miserable for himself and everyone else. He wastes power in starting with a jerk, and tears down equipment in stopping with a jerk. He causes accidents and pain. We have no room for him on the job.

Railway Would Swap Its Right-of-Way for Power Rights

The Niagara Gorge Railway, Niagara Falls, N. Y., has applied to the New York state waterpower commission for permission to utilize water in the lower Niagara Gorge for power development purposes. It offers to deed to the state its right-of-way along the lower Niagara gorge between Niagara Falls and Lewiston for a scenic motor highway in return for the power development privilege below the American falls.

Although several other corporations have made application for power rights in the lower gorge, the offer of the Niagara Gorge Railway to give up its right-of-way to the state for a great scenic motor highway has impressed the state commission and a hearing on the proposal will be held before the board in Albany at an early date. The offer of the company was made by its president on behalf of the board of directors.

The route of the Niagara Gorge Railway between Lewiston and Niagara Falls is at the base of the rocky cliffs and alongside the lower Niagara River. Through Gorge Route cars operate over the line in conjunction with the Park & River division of the International Railway, which operates along the cliff of the Canadian side of the river.

Company Unable to Finance Extension

"The Ohio Valley Electric Railway will pay anybody in Huntington 8 per cent on a \$40,000 loan, give the best of security and build at once the Norway Avenue extension," was the challenge flung by George I. Neal, counsel for the company, during his argument at a hearing before the board of commissioners in support of the company's application for more time in which to fulfill an obligation of its franchise. W. R. Power, general manager of the railway, discussed unreservedly the company's financial affairs and the same readiness was manifest in statements by H. J. Crowley, general manager of the American Railways, Philadelphia, principal backer of the local company, of which he is also the vice-president.

The extension in question was to have been completed by Oct. 23 next under penalty of \$20,000 forfeiture. The railway has petitioned the commission to extend the time for one year, although definitely planning to begin the work early next spring. The protestants are not insistent nor desirous of the commission exacting the forfeit, but they take the position that the company should get the money and finish the work before cold weather. The company says it is unable to finance the project at this time.

After listening to the arguments the commission reserved its decision.

Another "Five-Cent" Candidate

Henry H. Curran, Republican Coalition candidate for Mayor of New York City, made public on Oct. 10 his first statement on the traction situation since the plan of the Transit Commission was made public. He declares that the plan as indicated by its own words is of a preliminary nature, but that it holds out definite hope of several things for which the city has waited for many years. He urges, however, that the validity of the transit law be tested, and that it be amended next winter to "give back to our local government the power that it took away from us." Mr. Curran said:

I am for the 5-cent fare, I believe in it. As long as I am Mayor I shall fight for it. I know it is enough and I know also what a hardship it would work on the whole city if the unit of fare should be increased even 1 cent beyond the nickel.

Mr. Curran's statement gives a definite promise that when he is Mayor he will endeavor to co-operate with all the forces and agencies working for the good of the city.

The attitude of Mr. Curran toward any traction relief plan will not be determined, he says, by any consideration of the source of the plan.

Right to Inspect Buffalo Books Denied

Herbert G. Tulley, president of the International Railway, Buffalo, N. Y., has refused the city permission to inspect its books as the first step in the attempt of Frank C. Perkins, municipal commissioner of public affairs, to start proceedings for the restoration of the 5-cent fare in Buffalo. George Watson, an accountant, and Director Macomber of the bureau of public utilities, were authorized by the City Council to inspect the books of the company. In his public statement denying the request to inspect the books, President Tulley quoted from the latest reports of the company filed with the Public Service Commission showing it is not operating its city lines at a profit.

Commissioner Perkins, the Socialist member of the board, explained:

What we particularly want to find out is the amount that the company is saving through the cut in the wages of its employees; what its receipts have been in the last eighteen months and how much more it has been collecting than it would have collected if the fare had remained at 5 cents as provided in the franchise.

It also has been proposed by the City Council that proceedings be brought to have the railway sell weekly or monthly tickets.

Function of a Railway—To Educate

When you are in doubt ask the Dallas (Tex.) Railway. It can handle all your queries—how often are motors oiled, how many agents are employed to take care of the accident claims, etc.

The company established this "know-it-all" reputation on Sept. 19 when it had charge of the meeting of the Dallas Electric Club. The meeting was turned into an educational rally where 200 club members learned a thing or two.

Mayor Couzens Urges Action

Urges City to Proceed to Take Over the Day-to-Day Lines of the Detroit United

The taking over of the day-to-day lines of the Detroit (Mich.) United Railway according to the decision of the board of arbitration is favored by Mayor Couzens. On its part the Detroit United Railway has indicated its willingness to expedite the transaction leading to the city's acquiring the lines under arbitration. By taking over these lines the city will be enabled to add another cross-town line to its system in a very short time. This, the Clairmount-Owen line, with the Grand Belt which will be taken over, will make three cross-town lines in the municipal system.

Included in the matters to be arranged are the necessary release of the mortgages, by court action, on the Detroit United Railway tracks and the working out of an agreement for the interchange of running rights on the Detroit United Railway and municipal tracks or a system of transfers. It is understood that both the company and the city favor an interchange of running rights rather than a system of mutual transfers. The arrangements to be made involve the working out of details as to the amount to be paid by each party for the privilege of running over the other's tracks.

Further negotiations are under way relative to the extension of the municipal railroad lines into the village of Hamtramck, which is entirely surrounded by the city of Detroit. The clause in the ordinance providing for municipal ownership, which permits the city to build and operate lines up to 10 miles beyond the city limits, was inserted to provide for municipal lines into new territory as the city limits are extended. It is expected that eventually Hamtramck will become part of Detroit.

According to a report from Lansing the Supreme Court has affirmed the action of the Wayne County Circuit Court in refusing to grant the motion of the Detroit United Railway to dismiss the ouster proceedings started by the city in 1918. A Council resolution of July 30, 1918, provided for legal proceedings to obtain a judgment of ouster against the Detroit United Railway on all lines where franchises had expired. Shortly after this resolution was passed, the Kronk ordinance was passed fixing the rate of fare at 5 cents on all lines. The company took the matter of the Kronk ordinance into the Federal Court on the ground that it was confiscatory and that the Council was without authority to pass it.

The company sought to have the ouster case dismissed, claiming that the ouster proceedings should have been started by ordinance and not by resolution. It was further claimed that the Kronk ordinance amounted to a franchise renewing the company's rights in streets where franchises had expired.

The Supreme Court decided that the Council was within its rights in acting by resolution instead of by ordinance, and according to the Fort Street case decision, no Council action was necessary to justify the Corporation Counsel in proceeding with the ouster. It further held that the city had a right to reasonable control of its streets.

Paving Dispute Serious

City Uses Strong-Arm Methods in Seizing Funds of London Street Railway

Following a brief resort to law the City Council of London, Ont., and the London Street Railway have arranged an armistice in their paving dispute. The company, operating under a franchise agreement made in 1895, is held to fares which according to its president are the lowest in America. Shareholders have received dividends averaging only 4 per cent and since 1917 their investment has earned nothing.

The Ontario Railway & Municipal Board, after operating the property for a year relinquished it to the company and advised the City Council that without an increase in fares the company cannot improve the service or comply with its admitted obligation to pave its right-of-way.

Two years ago the city paved Rectory Street and billed the company for \$7,500 for its share. This amount remained unpaid. On June 10, 1921, the city obtained judgment for the full amount by default, the company admitting liability but pleading inability to pay. On Sept. 16, in exhibition week, a deputy sheriff seized all cash in the company's offices, amounting to \$1,550 to satisfy the judgment, and thereby forced the company to pass its pay day. On the following Monday the sheriff repeated the raid, but could find no money.

Subsequently R. G. Ivey, the company's legal adviser, negotiated a truce with the City Council on the understanding that the company will attempt to pay off the balance of the debt in monthly installments of about \$500 each. By another transaction the City Council decided, without prejudice to its legal rights, to accept President Currie's offer to regrade tracks, and to pave right-of-way on various streets with crushed stone and tarvia, though the city uses asphalt. On Stanley Street the city paved with asphalt and the company graded with gravel, employing men with brooms to sweep back loose stones, as the city threatened suit alleging that the company was responsible for mutilation of the new pavement. Under the settlement that section is also to be treated with tarvia.

The union of employees at a mass meeting decided not to press the company for payment on the regular pay day, under the circumstances, and President Currie has asked the Council for another conference on increased fares in the interests of better service.

News Notes

Freight Service Established.—The South Carolina Light, Power & Railway Company has started a freight service on its Glendale line. When the volume of business warrants it an extra number of cars will be pressed into service.

Railway Affairs to be Investigated.—A committee consisting of three city officials of San Diego, Cal., will be formed to look into the difficulties facing the San Diego Electric Railway and to offer suggestions for a solution of the transportation problem in that city. It was agreed that the committee should have the power to call in the assistance of outside statisticians and experts if that course were found necessary.

Hudson Valley Railway Wages Cut.—H. B. Weatherwax, vice-president of the Hudson Valley Railway, Glens Falls, N. Y., interviewed at Albany, N. Y., on Oct. 12 by the resident correspondent of the ELECTRIC RAILWAY JOURNAL, advised that the wages of the men were cut from 60 cents an hour on Oct. 1 to 55 cents an hour and that on Nov. 1 the wages are to be cut to 50 cents an hour.

Submits New Franchise.—The draft of a new franchise for the electric railway in Champaign, Ill., was recently submitted to the city officials by officers of the Urbana & Champaign Railway, Gas & Electric Company. The provisions were not made public, but it was reported that certain changes would have to be made before the city authorities would accept the proposed franchise. The official answer of the city is expected to be given out in a short time.

Extends Lines By Buses.—The City Council of Minneapolis, Minn., has ordered the Minneapolis Street Railway to extend its Second Street Northwest line several blocks to the Northern Pacific Railroad shops. This will be provided in about a month with buses. This will be subject to permanent determination by the Council. The company will give service on certain extensions next spring with trackless trolleys if the city will pave the streets, it is planned.

May Electrify Line.—Miami, Okla., will be the terminal for a new electrified line which will be an extension of the Miami Mineral Belt Railway. This announcement was recently made by H. M. Levy, superintendent of the above mentioned property. The line will run through the business section of Commerce, entering Miami from the northeast. Through service will be established between Miami and Baxter Springs, Kans. A preliminary survey is being made.

Financial and Corporate

Municipal Railway Financing Again Causes Concern

To provide funds for the purchase of twenty-five new cars for the Seattle (Wash.) Municipal Railway, to pay the city's present indebtedness to the Western Washington Power Company for the Greenwood car line in Ballard, and to provide funds for the retracking of First Avenue and First Avenue South, an ordinance was recently introduced in the City Council authorizing the sale of bonds in the sum of \$680,000.

The bill is a new draft of an old proposal which has been contemplated for a long time, but before being voted on it will be sent to the city's bond attorneys in New York City for approval, although they have already stated they would accept such procedure.

The Council will also undoubtedly await the report from D. W. Henderson, general superintendent of the railway, as to the possibilities of the trackless trolley, which he recently went East to investigate. The trackless trolley has been proposed as a measure to obviate the necessity of purchasing new rails for First Avenue.

The City Council finance committee has suggested through Chairman C. B. Fitzgerald a plan to change the character of the \$15,000,000 of bonds issued to the Stone & Webster interests in payment for the street railway system. The plan involves the cancellation of the present bonds and issuance of new securities, probably maturing in forty years.

The plan is offered as one of the ways by which fares may be reduced. It would greatly diminish annual payment on bonds, and together with added revenue resulting from the elimination of jitney competition, might aid in decreasing the present 8½-cent fare. The city is now under obligation to redeem in seventeen years the bonds issued in payment for the railway system. The annual payment under this plan is \$833,000, the first installment of which falls due on March 1, 1922.

Detroit United Financing Reported

It was stated at Montreal, Que., on Oct. 7 that the Detroit (Mich.) United Railway has practically completed disposal of \$4,000,000 of twenty-year notes to its own bankers and other interests. The issue replaces various short term issues shown in the last balance sheet as notes payable. It is also stated that the May 1 maturity of \$855,000 of subsidiary bonds and Aug. 1 of \$1,400,000, or \$2,255,000 in all, have been extended to Jan. 1, 1932, when the consolidated mortgage bonds expire. This financing together with conservation of cash through payment of scrip dividends, places the company in a more favorable

position, the sale of 29 miles of track-age and other equipment to the municipal road also making for a generally easier financial position. It is stated that cash dividends will be resumed in the near future.

Surprise Element Introduced \$2,433,067 Over Physical Value asked by Toronto Railway in Arbitration—Hearing Continued

W. J. Hagenah, expert witness for the Toronto (Ont.) Railway, occupied the stand during the week ended Oct. 1 in the arbitration proceedings to determine the value of the Toronto Railway system.

Evidence similar to that reported in the ELECTRIC RAILWAY JOURNAL previously was given in detail with respect to track and roadbed, overhead structures, and rolling stock. The summary of appraisal based on labor and material prices as of Sept. 1, 1921, showed a reproduction cost of \$26,110,044 and present value of \$20,032,837, made up of the following principal items:

	Reproduction Cost	Present Value
Way and Structure	\$9,649,321	\$7,759,834
Equipment	9,609,915	6,969,781
Power	3,259,951	2,157,249
General	1,819,857	1,374,973

In each case an additional value of the actual and tangible property was made of \$1,751,000.

The power plant on Front and Frederick Streets was given a reproduction cost of \$459,630 and present value of \$252,474. The structural efficiency of the building was estimated at 88 per cent. Substation equipment reproduction cost \$1,678,305 and present value \$1,265,488.

The steam plant on Front Street is not proposed to be taken over by the city, which intends to use hydro-electric power from Niagara.

An element of surprise was introduced into the arbitration when counsel for the Toronto Railway presented a claim aggregating \$2,433,067 over and above all the physical assets of the company. The total was arrived at by the addition of various items which the company claimed would have to be incurred if the present road had to be newly constructed. These items would include injuries to workmen during construction, salaries of executives and officials during period of construction, interest on capital during construction and legal cost.

The arbitrators decided, Sir Adam Beck, arbitrator for the city dissenting, to allow counsel for the company to present valuation estimates on a basis of the three-year period ending Sept. 1, 1921. The decision, however, is not final as to acceptance of such evidence as a basis of determining the value of the property.

Progress Slow in Providence

Business Depression and Jitneys Keep Down Earnings of Successor to Rhode Island Company

It is reported unofficially that the receipts of the United Electric Railways, Providence, R. I., the successor of the Rhode Island Company, during the first three months of operation were sufficient to pay operating expenses, taxes and fixed charges, but not sufficient to pay a 6 per cent dividend on the stock, to which it is entitled under the law. The earnings have been affected by the business depression, the competition of the jitneys and the motor buses. Receipts for the quarter recently ended were 15 per cent below those of the corresponding quarter of last year.

It is estimated that motor competitors are depriving the road of \$1,000,000 income a year, and this in spite of the ordinance passed by the Providence City Council early this year. This ordinance provided that jitneys and buses must run on specified routes during regular hours and subject to police inspection and control. It gave the City Council authority to bar motor vehicles from any street upon presentation of sufficient evidence that the public was being adequately served by other conveyances on that street.

Since this law has been in effect, there has been no decrease in the number of jitneys and buses operating in Providence. Last March, when the ordinance became operative, there were 281 licensed motor vehicles in the city. To day there are 286. The opinion prevails, however, that if the law had not been in effect there would be 1,500 jitneys and buses in Providence today instead of 300. The present regulations are too stiff for the fly-by-night operator to meet.

The permissive part of the ordinance has never been availed of to keep motor carriers from certain routes. There is at present no indication that the City Council will be in any hurry to act under it.

Gold Bonds of Georgia Property Offered

Stone & Webster are offering \$1,750,000 of Savannah Electric & Power Company's, Savannah, Ga., first and refunding mortgage 7½ per cent gold bonds. The bonds known as Series A are dated Oct. 1, 1921, and are due Oct. 1, 1941. The price is 97½ and interest to yield about 7¾ per cent. Coupon bonds are in denominations of \$1,000, \$500 and \$100.

The Savannah Electric & Power Company will purchase under the plan of reorganization all properties and franchises owned by the Savannah Electric Company and its subsidiaries, comprising a large part of the electric light and power business and the entire electric railway business in the city of Savannah. This issue of \$1,750,000 bonds has received the necessary approval of the Railroad Commission of Georgia.

Master's Report Condemns Management Contract

Management Contract, in Case of Columbus Railway, Power & Light Company, Declared to Be Against Public Policy and Illegal—Fees Held to Be Excessive—Profits from Engineering Service and from Sale of Securities Judged Reasonable and Legitimate

Declaring that "the executive operation and management of the street railway company by the banking house at Philadelphia was a plain usurpation of the powers and business of those corporations, in violation of the meaning, spirit and intent of Sec. 8660 of the General Code," Master Commissioner George B. Okey, of Columbus, Ohio, holds the management contract between E. W. Clark Management Corporation and the Columbus Railway, Power & Light Company to be illegal and against public policy. This case is one which, when finally acted upon by the higher courts, to which it is almost certain to be appealed, is apt to have a very important effect upon similar management contracts with public utilities all over the United States. The present report, being only the finding of a Master Commissioner, is, of course, not conclusive, but is important.

THE case in question is one which originated from a suit by one Augusta M. Slaymaker, a stockholder in the company, against the Columbus Railway, Power & Light Company, and others, including E. W. Clark & Company Management Corporation and various individuals who have been or are directors of the first named company. The original case soon lost its significance, however, in a cross petition filed by the Columbus Railway, Power & Light Company, against the E. W. Clark & Company Management Corporation and C. M. Clark, requesting an account and suing for restoration of certain funds totaling more than \$2,600,000.

The points at issue were fees charged under the management contract; fees and profits from financing operations for the company; loss claimed through the exchange of capital stock at times of reorganization; engineering and construction fees charged and collected by the Management Corporation; unvouchered expenditures of the company's treasurer; mismanagement as evidenced by voluntary surrender of franchises.

The master reviews the allegations of the Columbus Railway, Power & Light Company at length, and gives his conclusions of facts with reference to the points enumerated above, the sums involved as deduced from testimony all being listed. It is important to note that the master's final conclusion of facts is that in all of the negotiations the board of directors acted in perfect good faith and with ordinary care and prudence.

Coming to conclusions of law, the only transaction involving any question of illegality or excessive fee is held by the master to be the management contract. In all of the other transactions the E. W. Clark Management Corporation and E. W. Clark & Company are upheld. Under this management contract the E. W. Clark Management Corporation received from 1912 to 1919 1½ per cent of the gross income of the company for its services. Previous to 1912, the master points out, C. M. Clark was a vice-president and director of the street railway company, and was a partner in the banking house of E. W. Clark & Company, which for years had

handled the securities of the Columbus property. The master says:

The association was beneficial to the railway company and profitable to the banking house. The banking house received the annual salary of \$5,000, paid to C. M. Clark for his services as vice-president of the company; it received \$3,000 annually for its services in auditing its books and paying dividend and interest coupons; it received fair and reasonable banker's profits from handling its notes and securities; it was enabled to realize excellent profits from the services rendered to the company by its engineering organization which it maintained on the ground.

But the management contract, the master goes on to say, "was a radical step. By its terms E. W. Clark & Company were 'to assume the management of the company.' It was carried out in practice and interpretation to mean both executive operation and financial management."

The master then points out that E. W. Clark & Company, from April, 1912, to January, 1913, received \$345,166 for the management service and \$165,187 as construction fees for services rendered by the engineering department; in the same years they realized a profit of \$109,033 in handling notes and securities of the company.

In view of the "receipt of these large sums of money" the master commissioner gives his opinion that the management contracts "were unconscionable," and upon that ground should be regarded and treated as nullities, aside from the questions of corporate power upon the part of a company to enter into them and of invalidity by reason of the fiduciary relations above referred to. (The master had previously gone into great detail to point out the fiduciary relations of C. M. Clark as an officer of both company and banking house.)

The commissioner says that he cannot see that the services of C. M. Clark were of any greater value subsequent to 1912 than they were before that time, and the same thing may be said of the auditing or banking services of the banking house. Aside from these charges, and the salary of the president of the railway company, the master claims there was no consideration whatever passing from E. W. Clark & Company to the street railway company, and in his conclusion states that a decree should be entered for a judgment against E. W. Clark & Company

for \$345,166, subject to a credit of the annual sum of \$8,000, together with certain sums that were paid to the president of the company during that time. This virtually would annul the value of the management contract as such, substituting therefor the mere salaries of certain representatives of the Clark company holding official positions in the railway company.

The discussion and condemnation of the management contract is in such general language as to be applicable to most such contracts in the country. The master said:

As an abstract proposition, standing alone, there is nothing sinister in a fiduciary relation. On the contrary, no position in life is more commendable. A large part of the business of the world is transacted by those holding positions of mutual trust relationship. The mere fact of the existence of such relationship does not vitiate a transaction. Courts of equity do not interfere with agreements and transactions upon that naked ground. The books disclose hundreds of cases in which transactions were upheld, notwithstanding the existence of a fiduciary relationship, where full consideration was paid, where no advantage was taken, where full disclosures were made, and where no elements of fraud or wrong were found.

All such transactions, however, are subjected by courts of equity to the most painstaking scrutiny, to ascertain whether any element of unfairness or wrongdoing may be found to exist. If such proves to be the case the equity powers are ruthlessly enforced. They do not stop short of full and complete restoration of the *status quo*. If real estate had been received by the fiduciary, the conveyance is set aside; if money had been received by him, a decree for its recovery results.

The fiduciary relationship becomes a deciding factor in the "management contracts" in question, because of their wrongful character. Before and during the entire period of their existence, the defendant, C. M. Clark, was a member of the board of directors and vice-president of the street railway companies, and also a member of the banking firm of E. W. Clark & Company, with which the contracts were made. By reason of his remarkable personality and character he exercised a dominating influence in the affairs of the board.

As practically interpreted and carried out the "management contracts" operated as delegations of corporate powers by the boards of directors, with respect to the business and property of the corporation, which under the provisions of Sec. 8660, were impossible of delegation. It is no answer to this view to say that a corporation cannot, as a corporate entity, carry on its business, and that it must employ officers and agents for that purpose. The case here is wholly unlike the appointment, by a board of directors, of an officer, such as a president or superintendent, and the prescribing of his powers and duties. There is no analogy between such an appointment and the delivery by a corporation, of its entire executive and business management, to a foreign banking house. The directors are not the corporation, but only its agents. Such agents cannot delegate authority requiring the exercise of discretion or judgment.

The contracts were opposed to public policy, as well as in express violation of the statute. They were without consideration and are vitiated because of the fiduciary relation of the defendant, C. M. Clark, to the parties to them. They are not binding upon the *cestuis que trustent*, the stockholders. The interest of C. M. Clark as a director of the street railway and as such representing the stockholders, was opposed to the interest of C. M. Clark as a partner in the banking firm of E. W. Clark & Company.

As stated above, with reference to all other points, the master finds no error in action or excess in amount. Profits on bonds of \$180,000; for the resale of those bonds, of \$97,419; on resale of notes, of \$20,422, or for redemption of underlying bonds, \$200,583, are called just, fair and not excessive profits to the company. Engineering fees of \$165,087 are called not exces-

sive, and E. W. Clark & Company are said to have carried out this contract honestly, efficiently and faithfully.

At another point it is interesting to note that the master holds that it is not necessary for an accounting to be given by a treasurer who is given discretionary power in the expenditure of reasonable sums of money. The master goes on to say regarding this:

A public service corporation has a right to expend reasonable sums of money to protect itself against threatened attacks, sinister in character, and calculated to affect injuriously the proper and successful operation of its business. It may expend such a sum in published propaganda, educational in character, with the end in view of planting in the public mind a just and fair comprehension of the relation which should exist and prevail between the citizen and such a company. We live in a practical and not a theoretical world. It is important and necessary for our service corporations to make expenditures every day, not at all improper in themselves, which it would not be wise to shout from the housetops.

The mere fact that the books and accounts of such a company are kept in such a manner as not to disclose the minute purpose of each expenditure furnishes no presumption of illegality or impropriety.

The entire case will probably come up for review before Judge Kincaid before the end of the current month. No matter what his decisions are with reference to the master's findings, it seems evident that the case will be appealed by one side or the other, if not by both, until a decision on the various facts involved is obtained from some court of final resort.

Purchase Review Case Argued

The appeal of the Puget Sound Power & Light Company, Seattle, Wash., against a decision of the District Court, denying an injunction against S. B. Asis and thirteen other taxpayers, asking for a review of the purchase of the lines now included in the Seattle Municipal Railway System, was argued recently in the United States Circuit Court of Appeals in Seattle. The matter was taken under advisement by the appellate judges. Arguments were confined to legal points of the matter.

Financial News Notes

New Hearing Date Arranged.—Judge Julius M. Mayer in the Federal District Court on Sept. 30 postponed the hearing on the application for a receivership for the Interborough Rapid Transit Company, New York, N. Y., until Oct. 27. This is the fourth adjournment in the matter.

\$182,525 Loss in Boston in August.—Operation during the month of August, 1921, resulted in a further temporary set-back for the Boston (Mass.) Elevated Railway. Revenue failed to meet expenses by \$182,525. As a matter of fact, the total business was \$151,064 less than during August last

year. The outstanding deficit, therefore, on Sept. 1 was \$193,026.

Railway Sells Land.—The application of the Public Service Railway, Trenton, N. J., for the sale of a parcel of land in Paterson to James J. Murner, was sanctioned by the Public Utilities Commission recently. It was declared that the land was not necessary for the immediate or future corporate use of the firm.

Interurban Fares Permitted to Stand.—The Detroit (Mich.) United Railway will be permitted to continue to collect on its interurban lines the fare charged under the act of the Legislature in 1919. The United States Supreme Court on Oct. 10 declined to review the case and the decision of the Supreme Court of Michigan permitting increases will stand.

Old Niagara Interurban to Be Abandoned.—The International Railway, Buffalo, N. Y., has informed the municipal authorities of North Tonawanda that it has decided to abandon its old Niagara Falls interurban line between North Tonawanda and the Niagara Falls city line. All traffic will be diverted by the railway company to its new high-speed Buffalo-Niagara Falls line.

Interest Paid on General Mortgage Bonds.—H. A. Ferrandou, treasurer for the receiver of the New Orleans Railway & Light Company, New Orleans, La., announced recently that the July 1 coupons of the 4½ per cent general mortgage bonds of the company would be paid on and after Sept. 30, upon presentation at the office of the New York Trust Company.

Exchange of Securities Nearly Completed.—Of the approximately \$24,000,000 of United Railroads of San Francisco 4 per cent certificates issued by the depositaries against the general first mortgage 4s of 1927, all but about \$2,000,000 issued by the Equitable Trust Company and Guaranty Trust Company, New York, have been exchanged for securities of the Market Street Railway under the plan of reorganization.

Sale Under Foreclosure Ordered.—G. Ray Craig, special master commissioner, has announced the date of sale of the property of the Plymouth & Shelby Traction Company. The sale will be held on Oct. 29, in Plymouth. The court has ordered the master commissioner to have the bidders post \$5,000 before being allowed to submit a bid, and no bid for less than \$20,000 will be accepted. C. G. Taylor is receiver of the company.

Foreclosure Expected to Be Averted.—Representatives of interests affected by filing of suits appeared in United States District Court and asked for order of foreclosure on the St. Louis & Suburban Railway, St. Louis, Mo., because of default on \$2,000,000 first mortgage bonds. The withdrawal of lines from the United Railways system will be averted, it is believed, as holders of underlying securities may ad-

vance funds to protect their interests. No date has been set for a hearing.

Line to be Discontinued.—The Georgia Railway & Power Company, Atlanta, Ga., will discontinue service on its line from Oglethorpe University to Camp Gordon. The State Railroad Commission ruled recently that it had no authority under the conditions under which the Camp Gordon was built to prevent this discontinuance. There were no franchise obligations, the extension having been made and restricted to the period of the maintenance and continuance of Camp Gordon as a training camp for federal troops.

Railway Holding Its Own.—In the opinion of W. H. Sawyer, receiver of the Alton, Granite & St. Louis Traction Company, Alton, Ill., the railway is keeping up very well despite the period of depression. In the month of August the company made \$300 in Alton though of late there had been no profit at all on the Alton lines. The installation of one-man cars, the receiver believes, is the reason for this gain in revenue. However, the interurban business has fallen off considerably, due, in the receiver's opinion, not to higher fares but to the increasing number of automobiles.

Interborough Prepares to Pay Manhattan Dividend.—The New York Stock Exchange has received notice from the Manhattan Railway of the declaration of the regular quarterly guaranteed dividend of 1¼ per cent distributable to holders of record of Oct. 7. The payable date has not been fixed as yet. The committee on securities of the Stock Exchange has ruled that the stock shall not sell ex-dividend on Oct. 7, and that all deliveries after that date must be accompanied by a due bill for the dividend. The dividend is guaranteed by the Interborough Rapid Transit Company under the lease of the Manhattan (Elevated) Railway to that company.

Montreal Tramways Contemplates Financing.—E. A. Robert, president of the Montreal (Que.) Tramways, at the close of the meeting of the directors on Sept. 14 stated that he had no definite information to give out regarding the proposed new financing. He admitted, however, that negotiations were in progress with leading American and Canadian financial houses, and that now it was largely a matter of waiting for a more favorable money situation in order to secure the necessary capital at a rate more commensurate with pre-war terms. It is stated unofficially that from \$6,000,000 to \$8,000,000 will be required to meet obligations during the next year or two, in order to permit the management to carry out a program of betterments and extensions affecting the entire system. This amount will be required to buy in maturing bonds in 1922 to the extent of about \$3,250,000, while at least \$2,000,000 will be required for capital expenditure already made, and at least another \$1,000,000 or thereabouts will have to be provided for 1922 under the same heading.

Traffic and Transportation

Results of Decreased Fare Not Satisfactory

Just what has been the result of the decreased fare, or 7-cent charge which went into effect on Sept. 1 on the lines of the Washington Railway & Electric Company, Washington, D. C., is seen in an estimate made public recently by W. F. Ham, president of the company.

For the first three weeks in September of this year there has been a loss in passenger traffic of 214,950 passengers with a 10 per cent cut in revenue as compared with operation for the same period a year ago. Mr. Ham states that if this reduction in travel continues for the eight months for which this order is effective at the same rate of reduction as in the first three weeks the company will suffer a loss in revenue of approximately \$650,000 a year. A similar loss has been suffered by the Capital Traction Company, the other operating company in Washington. This property carried 3,975,365 passengers for the first three weeks of operation under the 7-cent fare against 4,073,475 hauled in the similar period in 1920. The revenue collected amounted to \$285,015 against \$309,003 for the same period of last year.

Cities Win on Five-Cent Fare Issue

The existing contracts between the cities of Decatur and College Park with the Georgia Railway & Power Company have been held valid, thereby sustaining the 5-cent fare between these municipalities and Atlanta. This opinion was recently handed down in the Supreme Court of Georgia as a result of the railway's efforts to extend the 7-cent fare.

Passengers who have been paying the extra 2 cents can now be reimbursed by the railway if they hold receipts. The ruling means that between Decatur and Atlanta and between College Park and Atlanta no more than 5 cents per passenger can be charged as provided in the original contracts.

President Shannahan Protests Against Jitneys

John N. Shannahan, president of the Newport News & Hampton Railway, Gas & Electric Company, Newport News, Va., is up in arms against the jitney. He insists that the auto pirate shall be put on a footing with the electric railway as regards its obligations to the public and has asked the Council to take steps to this end. According to Mr. Shannahan his company is losing about \$150 a day in revenue to the jitneys.

As a result of Mr. Shannahan's protest City Manager Thom has been requested by the Council to make a com-

plete investigation of the entire situation and to recommend at the next meeting of the Council, if possible, what action the Council should take to remedy the situation.

The patrons of the jitney are recruited largely from those who are rankled at the continuation of the charge of 7 cents for fare by the railway in the face of lowered costs for a great many commodities and of lowered wages generally among the manufacturing classes.

Bus Petition Allowed

Receiver of Interurban Scored by State Commission for His Unprogressive Attitude

The Illinois Commerce Commission has granted the Smith Bus Line Company the right to operate motor cars on regular schedule between Aurora and Big Rock. The Aurora, Elgin & Chicago Electric Railroad, through its receiver, Joseph Choate, opposed the authorization of the bus line. The Commerce Commission held, however, that the railway was not giving adequate service and that the bus line, especially between St. Charles and South Elgin, would not compete with the railway.

The bus line between these points is required to operate its cars on the west side of the river, whereas the railway is on the east side to a point close to South Elgin. The bus line expects to put cars in operation at least by Oct. 15. Before it can give authorized service it must furnish a \$10,000 bond on each automobile to protect its patrons in the event of accidents.

The commission says that although the railroad receiver had been requested to extend its line from the corner of Wilson Street and Batavia Avenue, east on Wilson Street, across Fox River, approximately one-half mile, the company refused to extend the line and serve the public on the east side of Batavia. A substantial part of the business district of Batavia is situated in that district where there is a population of approximately 4,000 people.

In commenting on this attitude of unwillingness of the railroad to meet the public demand for service the commission said:

When a public utility is serving a district under conditions which amount to a monopoly and declines or omits to extend its service to additional territory where it appears, as it does here, that it will greatly convenience the public and that a necessity exists for such service, such public utility should not be heard to complain that if another is permitted to enter the field and furnish substantially the same or better service, its revenue will be materially reduced because of the competition that will be created between the two public utilities.

Modern methods employed in furnishing service to the public generally should and will be encouraged when it appears that substantial justice requires it and that the public will be permanently benefited.

An examination of the evidence indicates clearly that the service of the Aurora, Elgin & Chicago Railroad is inadequate.

City Extends Its Bus Operations

After receiving temporary permission from the city utilities committee to operate buses to the Cowen Park district of Seattle, Wash., jitney drivers were two days later again driven from the streets, after a stormy session of the City Council at which five councilmen of the eight voted permanently to oust the jitneys from all Seattle streets, except, where they serve as feeder lines. The drivers were forbidden to load or unload passengers within areas served by city street cars, except at their downtown terminus, but this did not prevent the city from rescinding its order.

Residents of the districts protested against the withdrawal of jitney service with the result that Councilman Carroll has proposed the installation of bus service such as is now used in Carleton Park and Laurelhurst, where the residents have purchased and donated to the city the buses in use on these lines. A fare of 10 cents is charged on these buses, with transfer privileges to and from the Municipal Street Railway with which they connect. This plan has also been arranged for another section of the city, South Beacon Hill, not now served by city cars, where the residents have purchased a truck and the city is constructing a body for the vehicle, so that it may be used for passenger service.

Three-Cent Fare Plan Opposed by Property Owners

The proposed plan of Oliver T. Erickson of the City Council of Seattle, Wash., to meet all operating and maintenance costs of the Seattle Municipal Railway by taxation, charging only extensions and betterments against operating revenues, has met with strong opposition by property owners. The *Seattle Times* states that analysis of the plan shows that property owners in the city will be paying into the city treasury \$11,659,078 in taxes instead of \$6,647,303 levied for next year. The Erickson plan is known as the 3-cent fare plan. It is proposed in an initiative ordinance now being checked by city registration clerks to ascertain whether it contains sufficient names of qualified voters to compel its submission on the ballot at the next municipal election in May.

According to statements made by State officials, the above estimate of increased taxes would be further enlarged by an item of approximately \$900,000 for interest on outstanding warrants and bonds, as the classification of accounts for the Municipal Railway, prescribed by the Bureau of Inspection and Supervision of Public Offices of Washington, effective on Jan. 1, 1921, requires that interest on outstanding warrants and bonds be made an operation and maintenance charge. The interest paid by the railway on outstanding bonds and warrants during the first six months of this year totaled \$434,312. In a year, this sum would be approximately \$850,000 or \$900,000.

City's Case Closed

Chicago Ends Argument By Which It Hopes to Secure Return of Five-Cent Fare

Hearings were begun on Oct. 4 before the Illinois Commerce Commission on the city's petition to restore the 5-cent fare on the Chicago Surface Lines. With the evident intention of getting a prompt ruling the city closed its case after four days and an adjournment was taken until Oct. 11 when the company began putting in evidence to show why the 8-cent fare should be continued in effect.

The main contention of the city is that the valuation of the properties fixed by the previous commission is too high by \$80,000,000 and that by proper economies the companies could exist on a 5-cent fare. It was shown that the city's share of earnings from the surface lines would amount to \$29,573,144 by next February. These payments have been made annually since 1907 under the ordinance provision by which 55 per cent of the net receipts of the railway goes to the city.

It was contended that the following items should be deducted from the capital account of the companies: Franchises, \$9,016,971; organization and other intangibles, \$8,000,000; property superseded in rehabilitation, \$14,794,666; 15 per cent for engineering and brokerage, \$12,739,080; patents, \$56,193; horses, \$34,100; bridges, \$996,733; cars renewed in 1915, \$1,026,033; interest and discounts, \$2,379,294; total, \$50,105,215. It was also claimed that the companies gave a lower valuation of the properties for taxation purposes.

MOVING PICTURES SHOWN AT HEARING

A feature of the hearing was the exhibition of moving pictures showing crowded cars. The city claimed that the conditions portrayed were typical of service conditions. President Henry A. Blair was called as a witness by the city to testify about certain expenditures during the 1918 campaign for a new franchise.

George W. Jackson, special traction engineer for the city, was also called. He proposed various economies which he said would enable the companies to operate at a profit on a 5-cent fare. He said that by re-routing and other changes there could be handled a 50 per cent increase in revenue passengers, but he did not show where these would come from or how they could be taken care of on present equipment. His plan for re-routing would mean the abandonment of about half of the downtown trackage and simplification of loops. He would use loading platforms 300 ft. in length and would abandon the use of river tunnels which are now the principal inlets and outlets from the loop district.

Mayor William Hale Thompson was also used as a city witness and gave it as his opinion that a 5-cent fare would be practicable on the surface lines even without wage reduction. He insisted

that some other large cities are giving good service on a 5-cent fare.

One of the newspapers published a statement showing how the 8-cent fare of the surface lines was distributed for the month of July, 1921, as follows:

	Per Cent	Cents
Wages	54.12	4.299
Materials, power and other expenses	17.26	1.371
Taxes	3.50	.273
Damages	4.13	.328
Companies' 5% return.....	13.78	1.095
City's 55% of net.....	3.97	.315
Companies' 45% of net.....	3.24	.258
Total	100.00	7.944

This raised the question as to how the road could be operated without reduction of wages on a 5-cent fare.

Eight-Cent Jersey Fare

United States Court Restrains Utility Board from Enforcing Its Seven-Cent Fare Order

The plea of the Public Service Railway, Newark, N. J., to the courts for an increase in fare over that allowed recently by the Board of Public Utility Commissioners was passed upon on Oct. 12. Pending determination of the company's litigation for a 10-cent fare, Federal Judges Woolley and Rellstab have granted the company permission to increase its rate from 7 to 8 cents, with an additional charge of 1 cent for a transfer. The order also grants a temporary injunction restraining the State Board of Public Utility Commissioners from enforcing its decision of last July, fixing the fare at 7 cents, with 2 cents extra for a transfer. Judge Davis filed a dissenting opinion.

The opinion by Judges Woolley and Rellstab holds that the Utility Board underestimated or excluded from its valuations approximately \$20,000,000 of the company's properties, and as the rates fixed by the board provide no return on these excluded properties, they are confiscatory. The only question, the majority opinion says, is whether the rate fixed by the State body is confiscatory "because based on a valuation of the property less than its worth at the present time." The Judges hold that the rate is confiscatory and therefore in violation of the Federal Constitution.

The rate fixed by the Utility Board, Judge Davis points out, gives the company a return of \$5,842,500, which, after paying all operating costs, is nearly 5½ per cent on the increased valuation fixed by the court itself. Judge Davis said:

Assuming that the board did underestimate or wholly exclude the properties to the extent of \$20,000,000 in view of the rate of return that the board's order permits, I should hesitate to say on a preliminary application, without the benefit of a full hearing, with many questions in doubt, that it was confiscatory. The Interstate Commerce Commission, composed of men of ability and experience and having at their command an advisory board of noted experts, allows the railroads a return of only 5½ per cent. If the court in this case is right, the Interstate Commerce Commission has confiscated the property of every railroad in the country—a most unlikely assumption.

To grant the increase to 8 cents,

Judge Davis figures the court has added \$20,000,000 to the value of the property of the Public Service Corporation, although the Public Utility Board had already allowed \$12,000,000 appreciation to go into the final valuation.

The court's order will give the company additional earnings of approximately \$1,400,000 a year, which is 7 per cent on \$20,000,000 of property. Adding this latter sum to the valuation of \$82,000,000 already allowed by the Utility Board, the court's action brings the valuation to \$102,000,000.

The Utility Board placed the cost of the physical property at \$70,000,000 and the figures are accepted by the court. The Utility Board, Judge Davis holds, "might have authoritatively said that it would be unfair to the public to base rates on an appreciated value to abnormal war prices, but it did not, and in its efforts to be fair allowed \$12,000,000 appreciation to go into the final valuation for the purpose of fixing a rate of return."

The injunction is not permanent, but only allows relief pending the granting of a permanent restraining order. Under the 8-cent fare allowed by the court, four tickets are to be sold for 30 cents. Refund slips are to be issued for the extra cent over the fare of 7 cents fixed by the commission.

Jitney Injunction at Albany Gets Setback

Due to the fact that the attorneys for the United Traction Company at Albany, N. Y., failed to comply with the rules of court procedure, the injunction restraining jitneys from competing with the United Traction Company in Albany and vicinity has been made non-operative pending an order to show cause granted by Justice Gilbert D. B. Hasbrouck.

The rules of the court and of practice require that when an injunction order is granted in court a copy shall be filed in the office of the county clerk of a county in the judicial district, and whenever service is made of a copy of the injunction upon a party affected, that a certificate of the county clerk shall be attached thereto showing the filing of the original injunction in his office and that the original signature shall be exhibited to the person upon whom the order is served.

This for some strange reason the attorneys for the traction company failed to do, the service consisting simply of a printed copy of the injunction restraining order.

As the situation now stands, the justice before whom the appeal is taken, will undoubtedly rule that no injunction exists against the persons served and that service will have to be made again to conform with court rules.

The practical effect is to restore the jitneys, which had been practically driven off the streets, until the court and the attorneys can untangle themselves. It really means renewed jitney service for another month at least.

Public Utility Body Denies Ten-Cent Fare

New Jersey Commission Rejects Company's Estimates and Denies Plea of Suburban Line

The New Jersey & Pennsylvania Traction Company was recently denied a 10-cent fare by the Board of Public Utility Commissioners. This company is known as the "Johnson Line." It was founded by the late Tom L. Johnson. It operates its cars between Trenton, Lawrenceville and Princeton, N. J., and a number of points adjacent to the Delaware river opposite and north of Trenton in Pennsylvania.

Some months ago the Public Service Commission of Pennsylvania granted the company a 10-cent fare on each of its zones, while the New Jersey board in June of this year issued an order on an application of the concern for increased rates, in which an 8-cent fare on each of four zones between Trenton and Princeton was allowed, with four tickets for thirty cents.

At a rehearing of the fare matter before the Utilities Commission it was contended by counsel for the company that there had been errors in the report of the board previously made. It was pointed out that in making an estimate of the number of passengers to be carried on the lines of the company for the ensuing year, the board erred in basing its calculations upon the number of passengers for the years 1913 to 1920 inclusive. The company contended that the years 1913 to 1916 could not be used as a basis of comparison because the number of zones between Trenton and Princeton had been changed from time to time.

Replying to the claim of the company on the conclusions of the board in relation to the number of persons carried, the board showed that there had been an increase in the number of passengers carried in 1918 and 1919 as against 1917.

It was estimated by the railway that the 10-cent fare for each zone would entail a loss in the number of passengers transported, amounting to 5 per cent, and it claimed further that under the schedule of rates permitted by the board, four out of five passengers would take the ticket rate of 30 cents for the entire trip between this city and Princeton, or vice versa.

The board declared in relation to this estimate that as this amounts to about ten per cent increase, as compared with upwards of 40 per cent increase under the 10-cent fare, it is apparent that the company would not lose 5 per cent under the schedule permitted by the board, and that an estimate of 1,655,000 passengers carried by the company in a year, as shown in the report of the commission in June, was based on facts.

The board emphasized the fact that the Johnson company would, under the 8-cent zone fare, receive 32 cents per rider between Trenton and Princeton, while the Trenton & Mercer County Traction Corporation, the com-

peting company, receives but 24 cents for the same trip.

Regarding the alleged error by which the company contended it would meet with a deficit of \$6,000, the board asserted that even if this were true, it would be offset by a saving of that amount made by the company by a reduction in wages of its employees.

Charlottesville Sells Transportation

The Charlottesville & Albemarle Railway, Charlottesville, Va., can well be proud of its record—it has never stopped paying dividends on either its common or preferred stock and is still operating on a 5-cent fare. The reten-

Over one million passengers carried on the street cars during the past year with no accident of any kind to any of them.

The street cars are the safest and cheapest means of transportation in Charlottesville. Use them often; we appreciate your patronage.

Don't envy the man with the automobile, when you can use a 70-horsepower electric limousine, all lighted, heated and ventilated, for one nickel, five cents. No radiator to freeze, no tires to replace. Use the street cars, we appreciate your service.

C. & A. Ry. Co.

tion of the nickel ride has increased patronage, especially in small towns with short rides. With the aid of newspaper ads the company has been putting across to the public the important rôle of the electric carrier.

Safety Work Alive on Interurban

During the last five years the Chicago, North Shore & Milwaukee Railroad has decreased its fatal accidents 77 per cent and decreased its accident costs to less than one-third of the average for all electric railways of the country. How extensively safety work is being cultivated by the employees of this railway is shown in the following letter which was received recently by a trespasser on the tracks of the railway between Chicago and Milwaukee. As an electric train whizzed past him at the rate of 60 miles an hour the motorman threw out this communication:

Don't you realize there is serious danger to any one walking these tracks, owing to the fact that our cars are run at high speed? If the motorman should fail to see you in bad weather, or while rounding a curve, or for some other reason, you would be placed in imminent danger of being killed or injured.

It is our desire to cultivate the safety work on this road to a point where every accident of an avoidable character will be eliminated, and we hope that you will at once discontinue walking on these tracks so that the chances of your being injured or killed will be done away with.

Yours truly,

CHICAGO, NORTH SHORE & MILWAUKEE RAILROAD.

School Ticket System in Force

Bulletin of Cincinnati Traction Company Describes Regulations Prescribed by Ordinance

Regulations to govern the method of selling the 5-cent fare strip tickets to children attending Cincinnati's public and parochial schools as required by an ordinance recently adopted by the municipalities of Cincinnati and Norwood are contained in a bulletin issued by the Cincinnati (Ohio) Traction Company.

The 5-cent school tickets will be sold only in blocks of forty rides for \$2 or in blocks of ten rides for 50 cents. The forty-ride tickets are intended to supply two rides each day for twenty school days in the month and will be sold on certain days in each month at the several high schools, by a representative of the traction company.

Walter Draper, vice-president of the traction company, said that by selling a month's supply at a time to the high school pupils the confusion of frequent sales and interference with classes as well as the employment of many additional agents by the company would be avoided. It can readily be understood, Mr. Draper said, that the school pupil tickets could not be put in the hands of the conductors for sale.

The tickets are good on all lines of the Cincinnati Traction Company and the Ohio Traction Company for school children ten years and over and under eighteen years of age and for use in going and coming from school.

The ordinance under which the tickets will be sold does not provide for the use by children attending private schools. The ordinance states that the school children's rate of fare shall be good for all children under eighteen years and the company in its regulations which must be approved by the city is compelled to adhere to this restriction. The ordinance specifically provides that the school fare shall be only by ticket. Conductors cannot accept cash less than the current cash fare for adults and children.

Mr. Draper said the tickets will be sold under the regulations previously outlined, which are temporary and may be changed later if found necessary to meet conditions. The plan for selling the tickets has been approved by Jerome Kuertz, director of street railways.

If at any time when the company's representative visits a school for the purpose of selling the month's supply of tickets any pupil has not used up the full number of rides on a strip already held, and the number of rides so unused is not sufficient for the succeeding twenty days, the unused portion of such ticket may be redeemed by being credited on the purchase of the new ticket.

Each pupil will be furnished with a certificate which must be filled out and signed by the principal of the school. This application must be presented to the representative of the traction company when purchasing tickets.

Railway Offers Motor Bus Service

Judge John O. Chapin, attorney for the Niagara Gorge Railway, Niagara Falls, N. Y., has returned to the village of Youngstown a proposed franchise for running regular trolley service between Niagara Falls and Youngstown during the winter months. The company claims there is not sufficient patronage to continue more than two round trips daily between the two points. The Gorge line proposes to run two-hour motor bus service if the village will give the line a permit.

Trackless Trolley or Buses, Which?

Negotiations are under way between the City Council of Buffalo and the International Railway for the operation of trackless trolleys in Bailey Avenue between Broadway and the north City line, a distance of almost 5 miles. Residents in the so-called Kensington-Bailey section of the city appealed for railway service, but the company says it cannot finance the laying of tracks in the street at this time and has suggested the use of trackless trolleys or large motor buses. There is said to be some objection on the part of residents to the use of buses.

Transportation News Notes

Will Charge Ten Cents.—A 10-cent rate of fare went into effect on the lines of the Aberdeen (S. D.) Railroad on Oct. 3. Coupon books are sold at the rate of 7½ cents.

Temporarily Suspends Increased Rates.—The Illinois Public Utilities Commission has suspended until Feb. 2, 1922, the proposed advances in freight rates sought by the Rockford & Interurban Railway, Rockford, Ill.

Mail Service Established.—United States mail service has been established on the Illinois Traction System's limited trains between Springfield and Peoria, saving twelve hours as compared with the steam road schedule. Two limited cars each way daily between Peoria and Springfield will carry the mail.

"Stop" Signs to Be Installed.—In order to help residents of Atlanta, Ga., to know where to board the electric cars of the Georgia Railway & Power Company 2,400 stop signs are being put up in all parts of the city. It is estimated that it will take one month before final installation of these signs.

May Try Trolley Bus.—After a conference with Sir Adam Beck, chairman of the Hydro-Electric Commission, Toronto, Ont., on the transportation problems of Peterboro, a deputation of Peterboro's City Council has returned and has announced that the trackless trolley may be installed in Peterboro as an experiment.

Freight Service To Be Abandoned.—The Philadelphia (Pa.) Rapid Transit Company has filed a new tariff with the Public Service Commission discontinuing all freight service on its line effective Oct. 31. No reason has been officially assigned for this, but it is believed that the profit is too small to warrant its continuance.

Buses Must Have Two Doors.—Interurban bus operators in Ohio were notified recently of a new ruling of the Public Utilities Commission that they would have to provide two doors for each bus before Dec. 1. There must be one each side or one side and rear. This is one of the first regulatory measures taken by the commission under the Graham law.

Railway May File Rates.—The State Railroad Commission has given permission to the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., to file its present interurban rates between Kenosha and Racine as a permanent schedule. At the same time the commission authorized the 7-cent rate in Kenosha and a maximum of 10 cents for travel outside of city.

Lower Jitney Fares in Effect.—Jitney fares in Youngstown, Ohio have been lowered to conform to the reduced rate of fare on the lines of the Pennsylvania-Ohio Electric Company, which operates in that city. The tickets which will sell at three for 25 cents, six for 50 cents and twelve for \$1, will be effective on all jitneys driven by members of the Elm Street Jitney Association.

Contenders Must File Briefs.—The Grand Rapids, Grand Haven & Muskegon Railway, Muskegon, Mich., an interurban, is having its troubles with the jitneys. It has sought an injunction to restrain the buses from operating. Judge Cross of the Ottawa Circuit Court has refused to grant the restraining order but has given both sides ten days in which to file briefs.

Wants Lower Fare.—The City Council of Niagara Falls, N. Y., will make an attempt to have the international Railway lower its rate of fare between Niagara Falls and Buffalo over the new high-speed interurban line. The round-trip fare is now \$1.30 compared with 50 cents before the war. The question of filing a complaint with the Public Service Commission is now with Corporation Counsel R. J. Moore.

Reduced School Fares.—The Augusta-Aiken Railway & Electric Corporation, Augusta, Ga., has reduced its rate of fare for all bona-fide school teachers and pupils to 5-cents a ride. The company will sell books of forty-four tickets for \$2.20. At the present 10-cent cash fare the books at \$2.20 represent a saving of \$2.20 and for those using the 8-cent tokens the saving will be \$1.32.

Railroad Will Operate Stages.—The first example of a steam railroad operating autos became public when the California State Railroad Commission authorized the Pajaco Valley Consolidated Railroad to operate stages in place of some of the unprofitable trains.

Between Salinas and Spreckles paralleling the rails auto stages will be run on the highways. Passengers, baggage and express will be carried at the same rate as on the trains.

Plan Offered for Through Service.—Operation of through electric cars between Toronto and Buffalo by way of Niagara Falls and the high-speed electric line of the International Railway is proposed by the Ontario Hydro-Electric Commission of Canada. T. A. Wilkinson of the provincial hydro commission's engineering staff, has been making an investigation of the feasibility of such a plan. A report soon will be made to the commission.

Must Perform Extra Services.—Supervisors of the Los Angeles (Cal.) Railway are now required to be capable of working on the emergency telephone board as well as handling traffic in the streets. The telephone men, formerly called dispatchers, now rate as supervisors. Arrangements have been made whereby all supervisors will spend a certain period in the emergency telephone work and an equal period in outside traffic work.

Decrease in Freight Rates Announced.—The Northwestern Ohio Railway & Power Company has filed a freight rate decrease on its lines from Ryan, a Toledo suburb, to Marblehead, Ohio. The decrease will be 20 per cent effective Oct. 13. Rates from Toledo remain the same on account of terminal rates. It is believed motor truck feeders and enlarged freight handling facilities at Ryan will enable much Toledo freight to take advantage of the decrease in rates.

No Fare Increase at Present.—Despite the fact that the stabilizing fund of the Toledo, Bowling Green & Southern Traction Company lines at Findlay has fallen from \$20,000 to approximately \$10,500 under the service-at-cost franchise granted a few months ago, there will be no raise in fare at the present time. The present fare is 10 cents cash, seven for 50 cents, or two for 15 cents. Increase fall business is expected to fill the stabilizing fund again.

Jitney License Transfers Attacked.—The Public Service Railway, Newark, N. J., will ask the Supreme Court to decide if the intent of the law passed last winter regulating jitneys is that license transfers should be treated the same as new applications. The company contends that they should be. The upholding of its view would mean that each transfer applicant would have to prove that continuance of the bus on a street through which electric railways run is a necessity and convenience. The commission has held that existence of the bus on a line justified its continuance if the ownership were unchanged. A writ of certiorari will be asked from the Supreme Court to test the question. The case of Carl A. Becker of West Orange, to whom the board recently granted a transfer of a Newark-West Orange line bus, will form the basis for the suit.

Personal Mention

Mr. Wakelee Assumes Additional Duties

Edmund W. Wakelee has assumed the title of general solicitor of the Public Service Railway in addition to his duties as vice-president of the corporation and its subsidiaries. The position was made vacant a short time ago by the death of L. D. Howard Gilmour.

Mr. Wakelee joined the Public Service law department about nine years ago as assistant general solicitor. He has represented the company in its dealings with municipal bodies, state agencies, etc. He became at once a member of the executive committee of the operating companies and of the public relations committee of the corporation.

During the formative period of the New Jersey & Hudson River Railway & Ferry Company (now the Bergen division of the Public Service Railway) Mr. Wakelee was its legal representative and was receiver for one of the underlying companies. He was also head of the legal firm of Wakelee, Thornale & Wright.

George H. Blake has been appointed assistant general solicitor. Mr. Blake has for years been one of the trial attorneys in the Public Service organization, devoting his time principally to the handling of claim department cases. Mr. Blake has been a member of the bar since 1908.

Retires After Fifty Years With I. R. T. and its Predecessors

Thomas Gerehart, general claim agent of the Interborough Rapid Transit Company, New York, and the company's oldest employee in the point of service, retired on Aug. 31. His initial connection with railways began shortly after the close of the Civil War in 1867 when he entered the employ of the West Side & Yonkers Patented Railway as a timekeeper, paymaster and bookkeeper, at which time the method of propulsion or operation was by means of an endless chain. In 1871, when steam engines were first used on the elevated, he acted as conductor and bookkeeper and when the New York Elevated Railway purchased the West Side Company he became cashier and bookkeeper. He was promoted to the position of assistant secretary and treasurer in 1878, which position he held up to 1890 when the Manhattan Railway took over control. He was retained by the Manhattan Railway as assistant secretary and treasurer until 1895, when he was appointed claim agent and continued in that capacity for nine years, when he was appointed general claim agent of

the Interborough Rapid Transit Company.

During his long career he inaugurated a number of principles in the investigation and adjustment of claims which have retained their value against changes of time and conditions.

Mr. Titcomb's Successor

D. W. Pontius, Manager of San Diego & Arizona Railway, Elected to Pacific Electric Post

D. W. Pontius has been elected vice-president and general manager of the Pacific Electric Railway, succeeding H. B. Titcomb, recently made president of the Southern Pacific Railroad of Mexico and the Arizona Eastern Railway. Mr. Pontius will be in full charge of all departments of the railway and will also be president of the Pacific Electric Land Company.

Mr. Pontius has been connected with Southern Pacific interests about thirty



D. W. PONTIUS

years, filling successively the positions of telegraph operator, station agent, trainmaster, district freight and passenger agent, and was first connected with the present Pacific Electric lines as traffic manager of the Los Angeles Pacific Railway, which consisted of the electric lines now serving the west coast beach resorts, Santa Monica to Redondo Beach, inclusive.

On Nov. 1, 1911, when the several electric lines of Southern California were consolidated with the Pacific Electric Railway, Mr. Pontius was selected as traffic manager, and filled that position until four years ago when he was appointed general manager of the San Diego & Arizona Railway at San Diego. That company is owned jointly by the Southern Pacific and J. D. and A. B. Spreckels, representing an investment of \$18,000,000.

Mr. Pontius's task was to complete construction of the line, with its attendant engineering difficulties, arrange

for the purchase of the equipment and place it in operation for the handling of transcontinental traffic between San Diego and the East. A greater part of this work was carried on during the World War and the resultant financial stringency, but was finally accomplished and means much to Southern California as a whole and San Diego and the Imperial Valley in particular.

Mr. Pontius will be succeeded as general manager of the San Diego & Arizona Railway by A. T. Mercier, who is superintendent of the Oregon lines of the Southern Pacific, which comprise 1221 miles of steam-operated railroad; three electric railway systems located at Salem, Eugene and West Lynn, and 150 miles of interurban railway radiating out of Portland.

Dean Cooley Heads American Engineering Council

Mortimer E. Cooley, dean of the Colleges of Engineering and Architecture of the University of Michigan, has been chosen by the organized engineers of the United States to take up the task laid down by Herbert Hoover when he became Secretary of Commerce. In announcing Dean Cooley's election as president of the American Engineering Council of the Federated American Engineering Societies, the executive board of the council outlines some of the problems which will face the new President.

Among these questions are unemployment; government reorganization, involving the establishment of a Department of Public Works and reform of the United States Patent Office; legislation by the various states on the registration of engineers; elimination of industrial waste and regional organization of the engineers of the nation along lines marked by Secretary Hoover and his associates in the council.

Dean Cooley is perhaps best known in the electric railway field because of his pioneer work in making valuations. In 1902 Mr. Cooley assisted in the appraisal of the mechanical equipment of Newfoundland railways, and in 1903 acted as consulting engineer in the Wisconsin railroad appraisal. In 1906 he was a member of the Traction Valuation Committee, Chicago; in 1907 appraised Michigan telephone properties; in charge of appraisal of hydro and steam-electric properties and railroads for the Michigan Railroad Commission since 1910. More recently he was in charge of making a valuation of the Public Service Railway, New Jersey. The total value of the property with which he has been concerned in appraising is about a billion and a half dollars, of which 85 to 90 per cent has been devoted to the public use.

It is understood that Professor Cooley has made arrangements which will enable him to give one-fourth of his time to active work for the organization, while leaving him sufficient opportunity to maintain his progressive upbuilding in the University of Michigan, which he has served forty years.

Frank G. Whitney, for the past fifteen years superintendent of substations, electric division, New York Central Railroad, has resigned to become superintendent of the Dutch Point Power Station, Hartford (Conn.) Electric Light Company. A farewell banquet was given in Mr. Whitney's honor on Sept. 22 by one hundred of his associates and employees of the New York Central Railroad. Mr. Whitney was presented with a handsome watch and a traveling bag as tokens of their esteem.

Obituary

L. E. Purnell, manager of the Cleveland office of the Ajax Metal Company, Philadelphia, died suddenly on Oct. 6. The Cleveland office will be continued in charge of an assistant until Mr. Purnell's successor is appointed.

E. M. Musier, cashier and paymaster of both the Eighth Avenue and Ninth Avenue Railroad Companies, New York, since they were returned to their original owners for operation on Aug. 1, 1919, died on Sept. 14. Mr. Musier had previously been with the Brooklyn (N. Y.) Rapid Transit Company for many years and prior to that was connected with the West Shore Railroad.

Henry C. Moore, formerly president and general manager of the Trenton (N. J.) Street Railway, died in Boston on Oct. 5. He was a member of the board of directors of the United Power & Transportation Company, Reading, Pa., which operated the traction lines at that place and at Trenton, N. J. Twenty-six years ago he was sent to Trenton to become president and general manager of the Trenton Street Railway. Mr. Moore was born in Philadelphia sixty-nine years ago and received his education there.

William Otis Chapman, Jamaica Plain, Mass., died on Oct. 6. He was born in Canton, Mass., seventy-one years ago. Mr. Chapman early in life, through his father, who was one of the organizers and builders of the Union Pacific Railroad, became interested in railroad enterprises, and more particularly in street railway and interurban railway construction. He was prominent in the building of the Braintree & Weymouth Street Railway, Braintree, Mass., and was part owner of the company until some years ago, when he sold his interests. He later became associated with the firm of Stone & Webster, and during his connection with that company he was in charge of the construction in Massachusetts of the old Blue Hill Street Railway, the Plymouth & Kingston electric line and also the Canton Street Railway. In 1890 Mr. Chapman built the electric railway between the towns of Hancock and Houghton, in the copper regions of Michigan, which was considered an extremely difficult piece of engineering.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE
MANUFACTURER, SALESMAN AND PURCHASING AGENT
ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Governor Harding Thinks Business Has Turned the Corner

In an extended article in the November issue of *System*, W. P. G. Harding, governor of the Federal Reserve Board, explains why he thinks business has turned the corner. He says among other things that since the first of the present year up to Aug. 31, loans of the federal reserve banks to their member banks have decreased about \$1,200,000,000, and as the notes discounted with federal reserve banks have been paid off, the federal reserve note currency has come back to the banks and in the absence of a demand for it has not been reissued. Other facts which he cites are as follows: The movement of prices, which has been steadily downward, has checked itself; the public has a great deal of buying power left and buying power begets buying power; the wholesale price index number which reached 272 now stands near 148; the total volume of federal reserve notes in circulation which showed an almost continuous upward trend during 1920 since then has been greatly reduced; when one important industry resumes, others automatically revive and industries are reviving.

Unfilled Steel Orders Increase

The United States Steel Corporation has just reported the first increase in forward business that has taken place since July, 1920. Unfilled orders as of Sept. 30 amounted to 4,560,670 tons, as against 4,531,926 tons on Aug. 31, an increase of 28,744 tons. While the increase was not large, the very fact that there was an increase was considered as one of the outstanding factors indicating a turn in the industry. The gain in forward business indicated a distinct picking-up in demand, for operations of the Steel Corporation were at a much higher scale than in the preceding month, and consequently for an increase in bookings to be recorded there had to be a decided expansion of demand.

The scale of activity of the corporation during September ranged between 30 and 40 per cent., the latter figure having been attained toward the close of the month. Production was probably in the neighborhood of 450,000 tons of finished steel during the period, so that incoming orders may have reached 500,000 tons, since some of the business during the month probably represented shipments from stock. The major portion of the new business taken by the corporation was in light products, notably sheet and wire goods.

For some time sheet mills have been operating at a scale much higher than other departments.

The peak of unfilled tonnage was reached in April, 1917, when bookings amounted to 12,183,083. There was practically a steady decline until May, 1919, when bookings increased, ultimately advancing to 11,118,468 in July, 1920. Another decline set in, which continued until September of this year.

Insulation Market Stronger

With the higher prices ruling for cotton yarns and cloth, the insulation market is on a little stronger basis and buying has been reported more active. The principal increase in buying has been noted in the field concerned with repair and maintenance work rather than in new manufacturing. Electric railway properties have shown considerable activity in this respect in the last three weeks in comparison with the light buying from that direction during the summer. Cotton insulation and cotton and rubber tapes are also moving well, and a noticeable increase in the purchases of mica is found. This is not only in insulation but also in tubes and washers for grid insulation, undoubtedly in anticipation of the winter's needs.

Some further price advances since Sept. 20 have been noted in varnished tapes and cloth. These have been around 10 per cent. Cotton yarns and gray goods at the mills have gone up again, and when insulation manufacturers come into the market for further supplies it is expected that still further advances in the price of finished insulation will result. Then, too, stocks of cotton cloth at the mills have been reduced and a temporary shortage may result. Mica prices have risen but slightly.

Copper Demand Still Strong

Copper is 13 cents a pound delivered to domestic consumers for October and November. Several million pounds of copper were sold in the export trade recently. Domestic demand continues good. Most producers are rather unwilling to sell at present quotations, so that it is becoming quite difficult for other than the larger buyers to obtain November deliveries at 13 cents. How much further prices will rise on the present buying movement would seem to depend upon how much of present buying is for early consumption and how much is advanced buying to take advantage of present prices on the supposition that producers will during the coming year adopt a wiser and more farsighted price policy than during the first nine months of the present.

Upward Trend in Coal Production

For four weeks in succession the production of soft coal has climbed steadily upward. The total output during the week of Oct. 1, including lignite, coal coked at the mine and railroad fuel, is estimated at 8,876,000 net tons. Compared with the week preceding this was an increase of 348,000 tons, or 4 per cent. The week's production was the largest since last January.

Electrical Sheet Prices Steady

Sheet production is running pretty high, one mill operating at about 85 per cent capacity. Electrical sheet operation is on a low basis, on the other hand, in line with the buying by electrical apparatus manufacturers, with considerable stock still on hand. Prices on this material are holding, no advance having been made with the September sheet advance and not immediate advance being contemplated, it is reported, on a newly announced rise of five dollars in sheets in several districts.

Buying Increased in Some Quarters

Slightly larger orders, more of them and a generally firmer tone to buying have been the characteristics of late of conditions among those dealing in electric railway supplies. This tendency of increased activity has been manifested by more numerous inquiries for material on which the frequency of replacement is necessarily rather high. The principal activity is seen in the standard items of gears, gear cases, brake-shoes, trolley wheels, etc. With respect to equipment and supplies which depend essentially for their sales on the purchase of new rolling stock, there have been practically no changes in the volume of sales recorded or number of inquiries received.

One manufacturer states that the prices of car equipment, especially motors, controllers, etc., have reached a level as low as present costs will permit. When it is considered that both copper and steel prices seem to be on an upward trend and that the average of wages paid to labor is but 40 per cent above the pre-war scale, it appears as though equipment prices cannot be lowered appreciably.

Electric railways, according to several manufacturers, have responded to the decrease in line and overhead material announced over a month ago by a favorable increase in buying. This condition exists notwithstanding that demand for line supplies has been somewhat above the average for a considerable period. Railways are undoubtedly anxious to benefit by reductions that have followed lowered copper prices, which they realize will probably not soon fall to such low levels.

Also the demand and sales of armature coil winding machines and other labor saving shop tools are reported to be still very active.

Manufacturers, in general, are optimistic over the volume of business

which they think should develop in the near future, for with improving financial conditions that are being announced almost daily the long-delayed yet necessary rehabilitation of rolling stock will result in good buying of equipment by car builders.

Rolling Stock

Brooklyn (N. Y.) Rapid Transit Company recently placed an order for 400 illuminated curtain signs to be used on its new subway cars, an order for 100 of which was placed some time ago.

Pacific Electric Railway, Los Angeles, Cal. has just added thirty new interurban cars to its service. Some of them will be put on the Los Angeles-San Bernardino line and others will be run from Los Angeles to the beaches. The cars, costing \$48,000 apiece, are the latest type of interurban electric railway cars. They are practically the same as the cars on the Los Angeles-San Bernardino line, with the exception that they are equipped with leather-cushioned seats instead of plush cushions. All the interurban cars of the Pacific Electric are to be equipped with leather seats as the cars go into the shops for repairs.

Track and Roadway

Valdosta (Ga.) Street Railway has replaced all of the old cross ties with new ones in the northern part of the city.

Tri-City Railway & Light Company, Davenport, Ia., is replacing its present light rails with heavier rail, the relaying being done between Clinton and Davenport with 85-lb. rail.

Eastern Massachusetts Street Railway, Boston, Mass., is doing a great amount of track improvement work. A 75 lb. rail is being laid for a half mile on the Lawrence line, taking the place of the old 43 lb. rail. On the Reading line to State Street, Tewksbury, the rails are being welded. The company also hopes to relay the rails in Central Street. Work is also in progress between Merrimack and Market Streets.

Public Service Railway, Newark, N. J., may be compelled to raise and maintain the trolley tracks in North Broad Street, Hillside, N. J., from the Elizabeth city line, during the repairing of that section of the thoroughfare. The Union County Board of Freeholders has filed a petition with the Board of Public Utility Commissioners to this effect. The trolley company refused to do the work, claiming that it did not have the necessary finances.

Pittsburgh (Pa.) Railways are seeking permission through the receivers to make the following repairs. New flooring in the Fleming Park Bridge at a cost of \$31,000; reconstruction of double tracks on West Carson Street between the Point and Smithfield Street bridges. This repair would require 2,100 ft. of double track at a cost of \$96,800. Permission is also sought to lay 1,700 ft. of single track in Wabash Avenue from Plank to Independence Street at a cost of \$24,200 and for placing 410 ft. of single track along Independence Street to Woodville Avenue at a cost of \$6,600.

San Diego (Cal.) Electric Railway began, on Sept. 6, relaying its tracks and paving on Broadway between Third Street and the Union Station. The new work will cost approximately \$100,000 and all possible man-power will be employed to complete the work with as little delay as possible. The section of track to be relaid and repaved is approximately $\frac{1}{2}$ mile long and, being double track throughout, will make a total of about 1 mile of new track. The type of construction will be of the most modern and approved character so far undertaken by any electric railway on the Pacific Coast, according to William Clayton, vice-president and managing director. An innovation so far as the San Diego Electric Railway's construction is concerned will be the incasing of the steel ties in solid concrete, eliminating entirely the use of the loose rock ballast heretofore employed with the wooden ties. The rails will be 114-lb. section. The use of the solid concrete incased ties is expected to produce a superior roadbed and add to the life of the track.

Power Houses, Shops and Buildings

Toronto (Can.) Transportation Commission, which took over the railway system on Sept. 1 last has a force of approximately 2,000 men engaged in the work of reconstructing various lines. At the Coxwell Avenue carhouse drainage, trackage and and switches have been installed and forty of the new cars ordered by the Commission are on sidings ready to be operated as soon as a wider devil strip is available. New car routes are also to be constructed on Blantyre Avenue, Coxwell Avenue, Carlaw and Pape Avenues and Broadview Avenues all in the east end. It is also expected that the commission will be able to complete arrangements with York Township Council for the extension of the crosstown lines running east on Danforth, Gerrard, Dundas and Queen Streets.

Trade Notes

Walter R. Pflasterer, railway sales engineer of the National Carbon Company in the Chicago territory, resigned on Sept. 1 to enter business for himself. He has organized the District Sales Company and is general sales manager with headquarters at 431 South Dearborn Street, Chicago. The District Sales Company will act as manufacturers' representatives handling railroad accounts in the Chicago district. Mr. Pflasterer has been connected with the National Carbon Company since 1914 when he entered their employ as sales engineer in the railroad sales department.

Sidney G. Down was appointed, effective Oct. 1, to the newly created office of general sales manager of the Westinghouse Traction Brake Company and Westinghouse Air Brake Company, with headquarters at Wilmerding, Pa. Mr. Down was formerly Pacific district manager of the Westinghouse Air Brake interests and president of the Westinghouse Pacific Coast Brake Company. Mr. Down joined the Westinghouse Air Brake organization twenty years ago, coming from the Michigan Central Railroad where he was employed as general air-brake inspector and instructor. He spent several years as instructor on the Westinghouse Air Brake Company's instruction car and was later appointed mechanical expert, with headquarters in Chicago. Eleven years ago he was appointed district engineer and transferred to San Francisco. Shortly afterward he was made Pacific district manager. Mr. Down was largely responsible for the organization of the Westinghouse Pacific Coast Brake Company, located in California, and when it was formed was placed in charge of its activities with the title of vice-president and later president.

New Advertising Literature

American Insulated Wire & Cable Company, Chicago, has completed arrangements for circulating the new leather-bound vest-pocket catalog on its "American Brand" wire and cable.

Elliott Company, Jeanette, Pa., has just issued two new bulletins. N-1 is on the "Deaeration Process" as applied to power, central-station and heating plants to prevent corrosion, and N-2 is on the "Deaeration Process" for hot-water service.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., produced, primarily for distribution prior to and at the recent convention of the American Electric Railway Association, a publication, entitled, "Review of Electric Railway Problems." This publication covers the subjects of mass transportation, multiple-unit control, recent railway motor developments, interurban service, freight haulage, snow fighting, automatic sub-stations, the safety car, the trolley bus, replacements of obsolete equipment, maintenance of electrical equipment, and there are several pages devoted to a description of various items of Westinghouse equipment such as electrically heated ovens, solder and babbitt pots, electric-arc welders, electric glue pots, etc. The last two pages of the book are devoted to a brief description to each of the important up-to-date railway publications available for distribution by the Westinghouse company.