

# Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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## It's the Sore Spots Which Stand Out Now

ONE of the most promising signs for the future of the electric railway industry in its relations to the public is the noticeable change in complexion of the situation as a whole. Now it is the few sore spots which attract attention, whereas a few months ago we were happy to see a few healed and healthy areas.

This condition, however, does not necessarily mean that all is well and further effort useless. These sore spots must still be healed, the remedies must be intelligently applied and the cure must be permanent. The whole industry is vitally interested that bad conditions, which have a contagious quality, do not spread again.

Those who are responsible for finding the solution in present points of trouble will best serve the industry and themselves by being sure that the solution is equitable and just. Their obligation extends beyond the areas of present trouble.

## Getting Along Well with Little

ONLY ingenuity on the part of master mechanics, combined with the widespread application of electric and gas welding and cutting, has made it possible to keep the "rolling" in rolling-stock during the past few years.

The straits to which some shops have been reduced are remarkable, to say the least. Sometimes energy that could have been used more advantageously in other directions has been expended in planning and constructing makeshifts. In war time this was excusable, but it should not be continued in peace time. This devising of apparatus to reduce maintenance costs is interesting, of course, but at this stage of the electric railway game there are, or ought to be, commercial devices to perform all routine operations. What is right for a factory is not so for a repair shop. There are exceptions, to be sure; cases in which the manufacturers have not "sensed" the need for certain devices or in which there is not sufficient demand to warrant development cost. And there is a broad field for ingenuity in applying the equipment that may be available.

Take, for example, this matter of welding. Possession of the finest kind of a welding outfit is just the beginning. Welding is an art and a science. Some enthusiasts think that the colleges ought to turn out "welding engineers." That's going too far, but many users of the welding processes, either in person or by deputy, are showing real engineering talent. The writer visited a shop some time ago where an impregnating outfit for armature dipping was sorely needed, but—you know the rest. Consequently the master mechanic found a discarded steel reservoir, some odd pieces of pipe, etc., and by the aid of electric arc and gas torch he has made something very creditable in the desired direction. It's too bad, in a way, that he had to do this, but he's going

to cut down armature maintenance costs, which is what he's after.

Everywhere, or nearly so, one finds that greater life is being obtained from wearing parts of rolling-stock equipment. The cost has been rising because everything costs so frightfully, but what would the costs have been if maintenance practice had not improved? Where the master mechanic has a fair chance he'll do even better. And it is a wise policy for his good work to be recognized when he does it.

## Pocket Veto May Kill Much Discussed Water Power Bill

AT THE time these comments are going to press President Wilson has apparently killed, by failure to sign, the water power bill which has been so long studied and worked over by Congress these past twelve years. The continuance of the influences retarding the development of this economical production of electric power for our railways and industries is especially serious in these days of high fuel costs and much needed conservation.

It is rumored that the bill received the indorsement of the Secretaries of Agriculture and War, who, with the Secretary of the Interior, would constitute the first Water Power Commission, but that Secretary Payne still maintained his well known opposition to the bill with its provisions regarding developments in the national parks. If this is so Secretary Payne must have taken a great responsibility or he has found at the last moment some element not evident to those who have studied the proposition carefully for many months. The President, of course, in his weakened physical condition has probably had to depend on his advisors.

The result, if the bill should be killed, would be serious and much progressive study and work on this water power legislation has been made ineffective. In that case, Congress, urged on by the engineering and industrial advice of the country, should of course pursue the constructive course of repassing the bill upon reconvening in December. Water power legislation then may assume an important political aspect.

## A Splendid Endorsement of Electric Trunk Line Operation

WE PUBLISH elsewhere in this issue an abstract of a committee report of the American Railroad Association, mechanical section, which comprises an interesting and instructive symposium of the operating experiences had by railroad operating men with their respective systems and conditions of electrification. Running through all these papers one observes an underlying loyalty for the particular system and type of equipment in use on the author's own roads, a rather natural reflection of the friendly controversy among the electrification experts. But through these some-

what biased expressions about the performance of the electric locomotive on the several roads one discerns that the foremost claims made for electrification have been unequivocally substantiated. These are the greater economy, increased capacity of the line, less delay attributable to engine trouble, greater safety and less discomfort for trainmen in tunnels, etc.

In the full report one author, referring to an element of the system in use on his road, points out how very successful the under-running third rail has been, while another infers that the overhead current collecting system is by all means the best scheme. The significant thing is that each system of electrification adopted on the various railroads has made good both technically and financially in a generous measure, which means that thus far no serious mistake has been made in trunk line electrification.

Nearly every one of the papers gives comparative data for steam and electric operation, showing very decided improvements in economy in favor of the latter. In view of these statements, we believe our surprise at some of the statements made by Mr. Basford in his able paper on the steam locomotive as an investment, also abstracted elsewhere in this issue, is well founded. He broadly describes those who have talked about the merits of electric operation as "propagandists," but we doubt if he will be disposed so to characterize the authors of the symposium papers to which reference was made when these come to his attention at the A. R. A. convention. The steam locomotive has done a great work, but the time is rapidly coming when it must give way more and more to its more economical, more efficient successor, the electric locomotive.

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### Engineers Have Made an Epochal Forward Step

THE greatest step, or at least the greatest potential step, in the history of engineering in the United States was taken on Thursday and Friday, June 3 and 4, at the Joint Engineering Conference in Washington. Assuming that the future action of engineers will be in line with their action at this conference, it is impossible at this time to foretell with any certainty the ultimate beneficial results, though one should have no fear of exaggeration in this regard.

An engineering voice which may speak with the authority and prestige of all engineers and groups of engineers has been created, and, most important, this voice has been created for the avowed purpose of public service, that engineering may take its legitimate share of the burden of decisions affecting national policy.

The Federated American Engineering Societies, the official body formed, is greater than any of its present or possible component parts. Drawing, as it will in its governing council, from every national and local engineering organization and affiliation, it will represent a composite engineering opinion and a composite engineering prestige which can and will make itself useful in the nation's service. It will not assume to speak in technical fields, already so well covered by individual societies; it will not attempt to speak in local or individual cases, unless there is a national element in the consideration. It thus cannot compete, as some would have us believe, with any existing individual organization; it is too big and too comprehensive. It is the organ for co-operation of all engineers for common effort.

The American Electric Railway Engineering Association, not composed of individuals, may seem to occupy a unique position with reference to the federated societies, but this should not in any way tend to operate against the association assuming its full share of co-operation in the federated societies. The indirect and intangible results which are bound to accrue both to engineering and to the nation from the activities of the American Engineering Council are of a nature which cannot be brought about by the activities of any individual association.

The ultimate result is a higher professional standing for engineering and the allied technical professions gained from the recognition of duties and obligations and the performance of acts in conformance with this recognition. Every engineer should see in this movement an opportunity and a duty to assist in making engineering and the industries and business attendant upon engineering take their proper place in the nation's social and economic structure.

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### Getting Together on Heavy Electric Traction

THE present is a fitting time to organize co-operation among the committees of the several associations interested in electrification of steam railroads. The report of the meeting of the heavy traction committee of the American Electric Railway Engineering Association, printed in the issue of this paper for May 1, page 908, shows that the need for some such co-operation is in the minds of railroad men. There is bound to be duplication of effort unless eventually some sort of clearing house for information is provided, such, for example, as a joint committee of associations having or to have electrification committees. Among such associations at present, in addition to the A. E. R. E. A., are the A. R. A. (mechanical section), with its committee on design, maintenance and operation of electric rolling-stock, C. H. Quereau chairman; the A. I. E. E., with its committee on traction and transportation, W. S. Murray chairman; the N. E. L. A., with its committee on electrification of steam railroads, F. M. Kerr chairman; the American Railway Engineering Association, with its committee on electricity, E. B. Katté chairman, and the American Society of Mechanical Engineers, with its railroad section of the newly formed committee on professional sections, Mr. Katté chairman. And undoubtedly there are other association committees in the same field. To be sure, the memberships of these committees are overlapping to a considerable extent. This is advantageous in partly preventing duplication, but it is burdensome to the men concerned.

All committees on electrification must necessarily collect numerous construction and operating data. This might be done by one committee rather than a half dozen, with good results to all concerned. Each of the fields represented by the national societies mentioned has a vital interest in electrification. The men who are active in these fields have all to gain and nothing to lose by co-operation. One of the first things to be done is to define the purposes and the scope of the heavy traction work of each committee. The more accurately these are defined the more effective will be the work of the several committees. Engineers are busy men, and they are impatient with any committee work which involves lost or otherwise useless motion. Their first query is this: "Is it worth while?"

## Iowa Judge Sets Precedents— with Complications

**I**N CONTRAST with the repeated decisions of the War Labor Board that the earnings of a company had no bearing on the rate of wage, Judge Martin J. Wade of the federal court, under whose direction the Des Moines (Iowa) City Railway is being operated by the receiver, has officially recognized the fact that an electric railway cannot pay out money that it has not earned to its employees in wages. This decision was made in connection with the award of 70 cents an hour maximum wages to trainmen by a board of arbitration, the approval of which by the court was necessary before it could be made effective, since the receiver had declared the company unable to pay that scale of wages. This decision of the court contained another very important precedent, for it was stated that before any higher wages than the 60 cents an hour scale ordered by the court could be paid the obligations for depreciation and fixed charges had a prior claim on the net earnings.

Summed up briefly, the terms of the Judge's decision were as follows: That the city has not given fair treatment to the company or the men; that the only source of money for paying interest and wages is from the fares received from the people of the city; that the present 5-cent fare is lower than that existing in any other city of comparable size; that the people are to blame if the service is bad, for they have been unwilling to pay for any better service; that the contract which the company had with its labor is not binding on the receiver except as the court has permitted the receiver to continue operation under that contract; that the court has the right to terminate this contract, but will not do so now. The decision then points out that it is impossible for the receiver to pay the 70 cents an hour wage awarded, orders the receiver to pay a maximum of 60 cents an hour dating back to March 1 in lieu of the previous 57 cents maximum, and states that if there is any surplus at the end of the year after the payment of operating expenses, depreciation and fixed charges as provided for in the franchise, and after the payment of certain preferred equipment claims, then the remaining surplus shall go to the employees in additional wages up to 70 cents an hour.

This is a very interesting ruling. The people get a deserved scolding; the employees get a slight increase and a promise of more if the company prospers; the company perhaps gets a little better assurance of its ability to continue as a going concern, and the bondholders get an indication that their first mortgage has priority over a prohibitive wage scale, if not much else, as a consolation. In one sense the decision places the employees on a bonus basis, it seems to us. If they are faithful in giving the best possible service and use their influence in helping the people to understand the necessity for increased fares they may be rewarded by a distribution of the resulting profit—a dividend on their labors. But just what this all means is in doubt; there are many complications ahead.

Whether there will be any surplus over fixed charges to award to the employees in Des Moines is problematical, for to date, in the absence of a public utilities commission, there has been no court decision in Iowa which indicated that the power to regulate the rate of fare was beyond that legislated to the municipalities, and the municipalities of Iowa have shown almost no disposition thus far to grant any increases in fares.

One decision of the State Supreme Court has upheld the full jurisdiction of the municipalities in this matter, but a rehearing of this case is in progress and a decision is expected on June 29. Its outcome is so vital a matter that all street railway activities in the State are being held in abeyance and all plans made contingent upon the outcome of this expected decision on the rehearing of the Ottumwa case. On this decision also hangs the possibility of the Des Moines company earning any surplus whatever; certainly there will be no surplus over fixed charges for increased wages on a 5-cent fare.

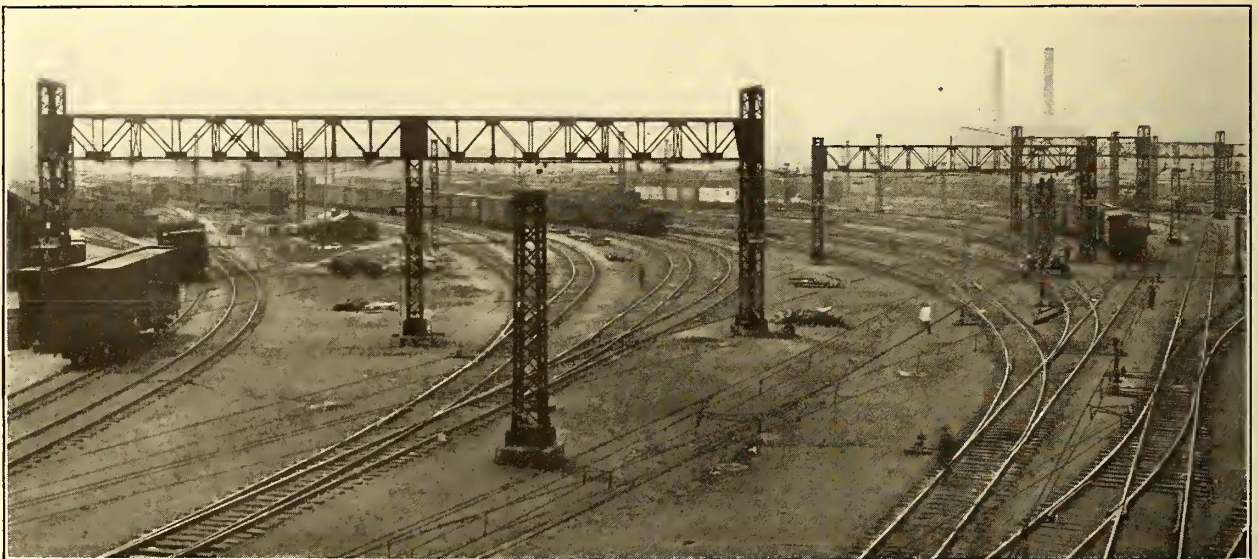
## How Will Municipalities Pay for Their Railways?

**I**F THE piecemeal plan of constructing the proposed municipal railway in Detroit, which is being attacked in the federal court, should finally be adopted the city financiers will have to determine what kind of a bond to sell to secure the \$15,000,000 authorized at the recent municipal election. That is to say, they will have to decide whether the bonds will have as security the credit of the city, like the ordinary city bonds, or whether they will have back of them simply the earnings of the proposed municipal railway. The ordinance, as we read it, is not clear on this point, so we are assuming the city will have a choice in the matter. If it does not, the question is still worth considering, because it is one which will arise in any city where the municipality purchases a railway or engages in any other commercial enterprise.

If the plan of pledging the credit of the city behind the bonds is followed, it is obvious that a lower rate of interest can be obtained than if the bonds are issued by a private company, as taxes will make up any deficiency in earnings. This, of course, is of great advantage to the security holder, but, conversely, is a serious objection from the standpoint of the taxpayer, who is thereby obliged to guarantee the earning capacity of the municipal undertaking. To avoid this, the expedient has been adopted in some cases of making the income of the utility the only security behind the bond, but to the bondholder this would mean that he would have simply an income bond on a property conducted by persons who have no selfish interest to see that an income is earned. It is hard to see that even a pledge on the gross earnings would be much more valuable than one on the net earnings, because it is only as an operating undertaking that the property has value. If a lien on the gross receipts is valuable because the security holder can extort his interest under threat to shut the utility down unless it is paid, the bond is open to the objections to a straight municipal obligation, already mentioned. Undoubtedly the immunity from taxation enjoyed by municipal bonds is a considerable advantage so far as the investor is concerned, but this advantage is secured, of course, at the expense of the taxing authorities, in the way of lower tax returns.

Broadly speaking, then, there is no economic benefit from the low interest rates obtained in municipal financing, as each supposed advantage is paid for directly or indirectly by the public. The only economic benefit possible to the public at large in the conduct of a utility is that to be secured from efficient operation, and that is more likely to result from private than from public management.

## Freight Yard Electrification Possesses Many Advantages



*There are thirty-five miles of track in the New Haven's Oak-Point Terminal Freight Yards in New York, of which three views are given above. When the possibilities of electrification become realities, yards like*

*these will not need such air spaces, but with double or triple level trackage, with streets and warehouses and other buildings constructed over the trackage, they may be economically located near the center of industry.*

# The Significance of Electrification

Official of Electrified Road Tells What Electrification Has Done and Indicates Possibilities He Foresees — Huge Air Spaces Recovered — New Conceptions of Railroad Operation—Many Corollary Advantages

By Edward G. Buckland

Vice-President New York, New Haven & Hartford Railroad, New Haven, Conn.

THUS far electrification has been adopted by steam railroads not upon general economic principles, but for individual reasons which applied locally. The main considerations have been (1) tunnel operation; (2) terminals; (3) track congestion; (4) fuel saving; (5) utilizing hydro-electric power; (6) mountain grade operation. These reasons have provided ample justification for the several electrification projects which are at present in successful operation, and often two or more of the reasons have applied in a given instance.

It is characteristic, however, of practically all of the main line electrifications which are now in service that electric operation is mixed with steam operation; that is, the two kinds of motive power are operated on the same division. The expenses of the electric operation are thus added to the cost of the steam operation, with no opportunity to realize completely the economies of the electrical installations.

The first demonstration of heavy electric traction in this country was in 1895, when heavy trains were moved electrically at slow speeds and at infrequent intervals through a long tunnel. In spite of the disadvantages to which a pioneer installation is necessarily exposed, this installation has been kept in operation and has continued to serve its purpose. The work went far toward demonstrating the technical practicability of conveying and utilizing large amounts of power, such as are required for operation under steam railroad conditions.

The operating characteristics of electric motive power are radically different from those of steam motive power and in general are greatly to the advantage of the former. The matter of control is a very striking example of this. In the case of steam locomotives one man is necessary on each locomotive for controlling its movements, and an additional man is required for maintaining the fire, whereas in the case of electric locomotives, equipped with the so-called "multiple-unit" control, one or several locomotives thus equipped may be handled with perfect ease by one man from any locomotive.

This feature is of great value, especially when applied to motor cars, in that trains of any length required may be made up to handle the traffic and operated from either end by one man. The expense of turning these trains at the terminals of the runs is also eliminated. Increased switching efficiency also results.

Another characteristic of electric traction is that the power produced by the electric motor is continuous and not pulsating, as is the case with the steam locomotive. Thus a more rapid acceleration can be secured with electric trains, especially with motor cars equipped with multiple-unit control. This enables trains to get away from stations more quickly and thus greatly reduces the schedule time of the runs, and is especially valuable for city and suburban service where many stops are to be made.

In a long tunnel in New England, the traffic through which is both freight and passenger, the congestion was very serious under steam operation. Although the tunnel is double tracked, only one train was allowed through at one time and much discomfort was often experienced both by train crews and passengers. Now, under electric operation, three trains are allowed through simultaneously in the same direction and no discomfort is experienced. The tunnel, so far as railroad operation goes, virtually does not exist. The increased capacity and added safety and comfort have justified the electrification in this instance. This experience has been duplicated in several other installations.

Edward G. Buckland, vice-president and general counsel of the New York, New Haven & Hartford Railroad, was president of the company during federal control, while the present president, E. J. Pearson, was federal manager. Mr. Buckland had a considerable part in the installation, some twenty years ago, of the first telephone train dispatching on the New Haven road and among the first on any railroad. He has always been interested in and a student of the possibilities and economies of electrification from the standpoint of a steam railroad officer. In the accompanying article he has recorded some of his views and interpretations.—*Editors.*

On another Eastern railroad the capacity of a single track tunnel on a heavy grade had been reached with steam operation. The railroad was faced with the necessity of either double tracking the tunnel or locating an additional track around a mountain. Either plan would have been very expensive. Electrification of the tunnel and grade was substituted and has postponed for some years, if it has not altogether eliminated, the necessity for the additional track. Regardless of other advantages obtained by electric operation in this instance (and they have been many) that item alone has justified the electrification.

There has been some development of terminals in large cities in which electric propulsion was substituted for steam propulsion because of the impracticability of using steam in tunnels and underground stations and because of the necessity for securing added track capacity in restricted areas.

On Manhattan Island in New York City there are two large trunk line terminals, neither of which would have been practicable as at present operated without electrification, as in both instances the tracks are virtually entirely underground. In one terminal the tracks run through the station and the coach yards are reached

by passing under the East River. The approaches to the station are also through river tunnels. The operation of the tunnels by steam would have been entirely out of the question under present traffic conditions. The other terminal is a stub end, and the tracks necessarily spread out over a considerable area. The elimination of steam through the tunnel approach was ordered by law after a serious accident and the terminal was thus virtually of necessity electrified. Advantage was taken of this electrification, when the terminal was enlarged, to install the tracks at two levels, thereby nearly doubling the track capacity at very little increase in land requirements. In addition, the area over the tracks has been made available for buildings, so that a minimum of real estate expense is chargeable to the terminal operation. Best of all, an ugly gash has been transformed into a boulevard 120 ft. broad and 2 miles long, with cross streets, all restored to public use. Property values formerly depreciated by the smoke and noise of steam operation have enormously increased. Locations formerly shunned are today the most sought after for residences, churches and modern high-class apartment houses. The savings thus made have alone justified the electrification, regardless of other economies and advantages.

In another large city the terminal congestion was such that the railroad was faced with the alternative of a substantial enlargement of the terminal or electrifying the suburban service. It chose to electrify, and the operation of suburban trains by multiple-unit equipment has afforded relief from congestion, due to elimination of numerous movements for shifting and turning locomotives. The track capacity at the terminal has practically been increased by about 20 per cent.

Application of electric traction in heavy mountain grade main line work has been made in several instances, both here and abroad, for the purpose of utilizing available hydro-electric power, increasing capacity of the line, decreasing operating difficulties on both ascending and descending grades, or for all of these reasons combined.

In many foreign countries and in certain parts of this country fuel is expensive and difficult to obtain, and in these territories there is often abundant water power. Under such circumstances railroad electrification is likely to offer attractive returns on the necessary capital investment, even though traffic might not be dense enough to warrant it under normal circumstances. Such localities are usually mountainous and the electric

locomotive solves many problems which under steam operation are very troublesome.

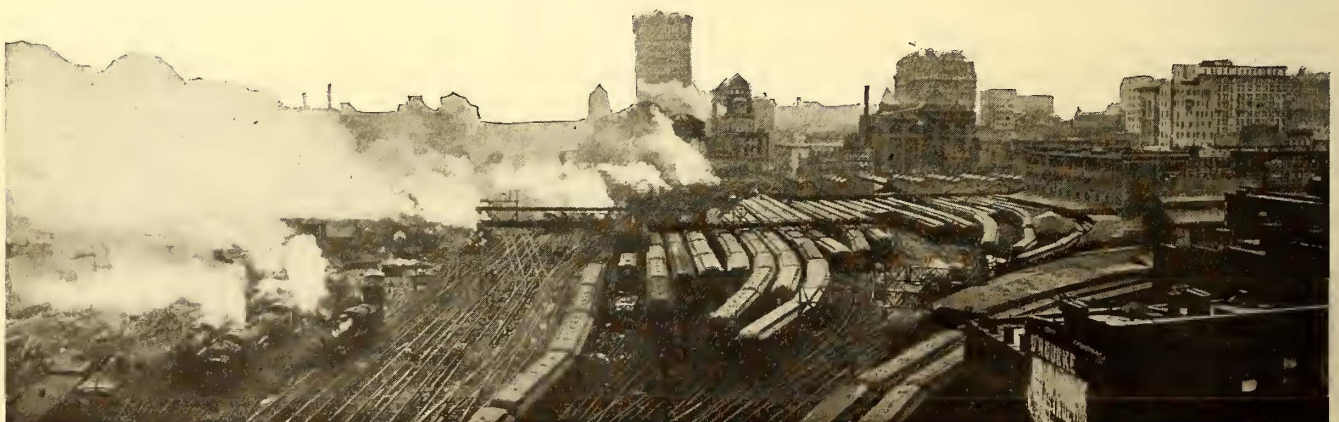
A characteristic of electric traction for mountain grades is that the electric locomotive may be so designed as to return power to the line when descending heavy grades. This feature is of great advantage in controlling the speed of the train independently of the brakes, and, in addition, the power thus returned to the line may be used in assisting the power station in hauling trains up ascending grades. It has been found in two instances of mountain grade electrification that the economies of regenerative braking form a large part of the operating economies, due to the saving on brake shoes and repairs to brake rigging alone and regardless of the increased safety of operation.

When it is considered that twenty years ago electric traction was limited practically to the ordinary street car, the progress has been truly remarkable, but in spite of the many important installations now in successful operation its development may be said to have hardly yet begun.

As electrification becomes standardized and as the art develops—and it is developing very rapidly—the advantages of electrification, economic and otherwise, will become more and more clear, and undoubtedly we shall see general railroad electrification in the not distant future.

One of the most distinct economies of electrification appears in the direct saving of coal, and this economy will become increasingly evident as our coal supply becomes less plentiful. We have been extremely profligate in the use of our natural resources, including coal; and a most wasteful agent in the consumption of coal, in spite of recent material improvements in design, is the steam locomotive, a machine in which efficiency is necessarily largely subordinated to capacity.

Smoke abatement and noise elimination are serious present day problems in large cities. Smoke is a disagreeable nuisance and it is the opinion of many authorities that it is distinctly harmful to health. It has a detrimental effect on vegetation, and by settling upon buildings detracts from their beauty in no small measure. It is particularly obnoxious because it is discharged into the atmosphere close to the ground and is trailed over long distances in the most thickly settled areas. It is not necessary to call attention to the disadvantages due to the noise made by the exhaust of steam locomotives—especially switching locomotives—in the midst of populous districts. Railroad freight and



*The Grand Central Terminal in 1906—before electrification. This terminal is a stub end and the tracks necessarily spread out over a considerable area. The elimination of steam through the tunnel approach was ordered by law after a serious accident and the terminal was thus virtually of necessity electrified.*

passenger yards and engine houses must be located in the vicinity of terminals in order that their full efficiency may be realized and the smoke and noise of steam switchers is therefore concentrated at these points. In a few cities the establishment of railroad freight yards outside of the city limits has been secured, but this has, of course, resulted in considerable inconvenience to shippers.

Looking into the future, to the time when steam railroads will be generally electrified, especially in the vicinity of large cities, we may predict that the passenger terminals will be operated at two or more levels, and that over the passenger yard areas will be erected revenue-producing office buildings and hotels which will allow practically full realization of the value of the land—land usually as expensive as any in the city. Passenger cars can be stored on tracks conveniently located within the terminal area at little cost for the storage space. Many non-revenue car-miles to and from yards can thus be saved.

Freight yards, similarly, can be located at points convenient to shippers and consignees, as it will be practicable to operate at more than one level, with warehouses immediately above the tracks for the storage of freight which has been unloaded or is to be shipped. It is not at all impossible to conceive that there will be developed facilities which will allow the freight car bodies to be removed from the trucks immediately upon receipt and lifted in electrically operated elevators to a floor above, where the material may be unloaded at leisure, another car body being installed on the trucks. The freight car may thus be immediately removed to make room for additional incoming goods. Such freight terminals, being operated at maximum efficiency and occupying little space, can economically be placed near the center of industry, thereby reducing to a minimum local haulage distances.

The smokeless and noiseless electric locomotives can be stored and operated wherever convenient for railroad operation without danger of criticism from neighboring land owners.

Travel on passenger trains is so comfortable under electric operation as compared with steam operation, especially in summer, that when electric operation becomes general travelers will wonder how it was possible to put up with the inconveniences of dirt and noise, such as exist at the present time.

Railroad operation undoubtedly will result in increased speed and reliability with the development of

electrification. Snow and extreme cold weather will no longer cause the interruptions and delays which they do at present. The power of electric locomotives can be increased practically indefinitely, to correspond with the demands of service, while the capacity of a steam locomotive is limited by track clearance requirements. Cold weather, which stiffens the oil in journals and increases train resistance, also increases materially the radiation losses of steam locomotives and thus reduces their available power. The same conditions increase the capacity of electric locomotives by increasing the allowable temperature rise, which is the limiting factor in the development of their power.

When a whole railroad system is electrified there will be many changes in the standards of operation. Divisions which are now practically limited in length by steam locomotive limitations can be made as long as desirable from an operating point of view. In one railroad electrification the electric zone includes in one operating division of more than 400 miles four divisions previously operated by steam. Coaling and water facilities are, of course, not required with electric operation. The release of coal cars required for distributing coal and of cinder cars, which are often required, is an important item in these days when railroads are many of them operating at or beyond the proper limit of their capacities.

In many cases great difficulty is experienced in obtaining the proper water supply, and, especially in the large areas in the West which are very dry for a great part of the year, in obtaining water at all. Many railroads in all parts of the country are obliged to spend large amounts of money annually for maintaining water softening plants, while pumping stations, track tanks and storage reservoirs are common to all railroads. All of these may be eliminated when electricity is substituted for steam.

As the manufacture and distribution of electricity for railroad use grows large power stations can be concentrated at points where coal may be conveniently and economically handled and used without disagreeable smoke and great quantities of water power which are at present going to waste can be economically exploited to haul trains.

There have been developed within recent years large and economical generating units which will increase coal-saving possibilities materially, especially with loads made possible by combination of the railroad with industrial and lighting service. This combination will



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increase economy of production and, by allowing the railroad transmission system to serve also as a commercial feeder, will make available at outlying points power which would not otherwise be economical. The use of such power when not required for other purposes is nearly unlimited. Electrical energy may be readily transformed into light, heat and power, and in these aspects can serve many of the necessities of modern life.

It is entirely feasible to use off-peak power for refrigeration, for instance; a large amount of perishable fruits and vegetables which are now wasted, owing to lack of transportation facilities during the season when they are ripening, could, if cheap refrigeration were available at the point where they are grown, be saved for market. Producers might create local cold storage plants where the refrigeration could be entirely accomplished by the use of electricity during off-peak hours. They would then be able in times of market glut to take their perishable products to cold storage and receive exchangeable storage receipts, whereby they could at their convenience market the product and avoid the disadvantages of an overstocked market. With the development of refrigeration, small refrigerating plants might be installed in all houses at a minimum price, by which air in the ice boxes could be kept continually cool through the use of off-peak hour electricity.

This secondary power might be economically used for other household purposes as well, such as washing, ironing and sewing machines and cooking; in fact, in California such developments are already in successful operation, helping much toward lightening the burdens of both city and rural housekeepers.

Water pumping, especially in the smaller cities and towns, might also absorb off-peak power to advantage. In agricultural districts the advantage of this form of power would be even greater than in urban districts and much land not now efficiently cultivated would be made available through irrigation.

When we look back fifty years and realize what progress the application of electricity has made, and when we think how dependent we are upon that form of energy today, it is difficult to predict what the next fifty years will bring forth. Railroads are as yet nearly undeveloped fields in this regard, and therefore one of the fields where future progress will be most impressive, all the more so because railroads are perhaps the branch of industry most closely associated with our national life.

There are, however, considerations which must be squarely faced and problems—both economic and engineering—which must be solved before electrification can become general. Many of the economies of electric operation are directly proportional to the ton-miles or train-miles hauled. It is obvious, therefore, that there is a definite traffic density beyond which the savings will not pay the cost of maintaining the distribution system (which is approximately proportional, not to the traffic, but to the miles electrified) and the interest on the additional capital invested. In these instances, unless there is some especial local reason for electrification, it would certainly not be justified, and to electrify under such circumstances would but discredit electrification as a whole and retard development.

The art of railroad electrification is, comparatively speaking, quite new, and much remains yet to be standardized. There is, for instance, still a great deal of doubt among engineers as to the relative desirability of alternating and direct current systems, and the advocates of each system can point to entirely successful

installations to prove their contentions. In the early days of railroading much expense and waste were experienced because track gages were not standardized, and, similarly, definite electrification policies and standards should be developed and made available in order that the obvious advantages of standardization and interchangeability may be obtained. There undoubtedly must be more experimentation before one system or the other can be adopted as standard.

The railroads which have already made electrification installations have of course borne the heavy expenses which are incident to all development and experimentation, but the data made available by these pioneers have been of inestimable value. The railroads which within the next few years install electrification will, by adding to and compiling information already gained, assist in standardizing heavy electric traction construction, just as street railways are standardized today. In this way only can progress be continuous. In this connection the experience which is being gained abroad will be of great value, as foreign railroads are deeply interested in coal conservation and their development of electric traction undoubtedly will be very rapid.

### Kilowatt-Hour Consumption in United States

ACCORDING to figures recently compiled by the Division of Resources, United States Geological Survey, the output of kilowatt-hours in the United States during January, 1920, was 3,854,599,000. Of this amount, 1,274,401,000 kw.-hr. was produced by water power and 2,580,198,000 by fuel. These figures are based on returns received from about 2,800 power plants of 100-kw. capacity or more engaged in public service, including central stations, electric railways and certain other plants which contribute to the public supply. The capacity of plants submitting reports of their operations is about 90 per cent of the capacity of all plants. The average daily production of electricity during January was 124,300,000 kw.-hr. The total production of electricity by public utility plants during 1919 was 40,003,000,000 kw.-hr.; 14,076,000,000 kw.-hr., or 36.6 per cent, by water power and 25,927,000,000 kw.-hr., or 63.4 per cent, by fuels.

The fuel consumption of the public utility stations in the United States during 1919 was as follows: 35,000,000 short tons of coal, 11,050,000 barrels of oil and 21,700,000 M cu.ft. of gas. The equivalent coal for all fuels consumed during 1919 would be 38,347,000 tons.

With 25,540,000,000 kw.-hr. produced by fuels in 1919, an average of practically 3 lb. of coal was required per kilowatt-hour of electricity produced. On this basis, it would have required the consumption of 22,140,000 tons of coal in addition to have generated the kilowatt-hours produced by water power.

### A. R. E. A. Will Join Council

THE American Railway Engineering Association has accepted an invitation from the United Engineering Society to become a member society of Engineering Council. This makes six member societies. The others are the American Society of Civil Engineers, the American Society of Mechanical Engineers, the American Institute of Mining and Metallurgical Engineers, the American Institute of Electrical Engineers and the American Society for Testing Materials.



# Bonding and Bond Testing on Electrified Steam Roads

Experiences on the Pennsylvania Railroad Electrification at Philadelphia Indicate That for Trunk Lines Different Equipment from That Developed for Street Railways Is Needed

BY JOHN W. LOGAN, JR.

Boston, Mass.

THE subject of rail bonding for trunk line electrifications has not been given the attention which it deserves. The methods of bonding and of maintenance, including bond testing, now in use are extremely elementary in their character. Bonding for city and interurban trolley systems has had the attention of engineers for years and new methods are constantly appearing, but these methods are not applicable to trunk line electrifications on which uninterrupted service night and day is the prime requisite.

In view of the fact that manufacturers continue their selling campaign on standard welding outfits for this purpose, it is evident that they do not understand the peculiar conditions, such as clearances, portability, etc., to which such an outfit has to conform in order to be of any service in this particular class of work. It is the purpose of this article to show the conditions under which work such as bonding and bond maintenance on important trunk line electrifications must be done, as well as the manner in which this work is now being handled on the Pennsylvania.

## BONDING WORK MUST NOT HAMPER TRAFFIC

The business of the Pennsylvania Railroad or any other railroad is transportation. Existing conditions demand the full use of all tracks and no obstruction of the rails can be permitted. For this reason all bonding apparatus is required to clear the running parts of the rails at all times. Welding outfits or pressure clamps as at present designed will not meet these conditions. Even a quickly detachable outfit is out of the question, because men who are required to work on the rails, where slow freight and high-speed express trains are passing continuously, have enough to think about in order to get themselves off the track to clear a passing train. The bonding outfit would not at times be detached and an experiment with such apparatus might easily prove disastrous. On the tramway system cars may be stopped by simply raising the hand or flagging, without much loss to the railway, but the "Broadway Limited," for example, cannot be stopped in this manner, nor can the railroad afford to grant track-bonding clearances for the working gang. It is this essential point that has been overlooked in the working out of track-bonding apparatus for use on steam roads.

The bonds used by the Pennsylvania are of the expanded-terminal type as manufactured by the American Steel & Wire Company and the Ohio Brass Company. Two bonds are used for each rail joint and both rails are bonded, except in the interlocking zones, where only one is bonded. The stranded conductor is equivalent to a No. 0 conductor, and when this terminal is expanded tight in a clean hole conductance is sufficient

for the 11,000-volt alternating current system. It should be understood that these conditions are theoretical, while actual working conditions sometimes differ widely, as will be explained later.

## BONDING PROCEDURE ON THE P. R. R.

Most of the bonds now in use on the Pennsylvania system were installed by the contracting engineers at the time of the electrification in 1914, and since that time the railroad has had to do only with replacements, such as are made necessary by rail displacements and breakage. A gang of about eight men does all the bonding.

When a trackwalker sees a broken bond he reports this to the electric traction department and places a temporary jumper around the joint. Two or three bonders are then sent out to repair the bond. If the strands are broken the terminals must be drilled in the rail web by means of a ratchet drill. If a whole section is to be rerailed an air compressor and air drills are used. Both kinds of drills clear the rails at all times except that the handle of the hand drill, when upright, projects 2 in. above the rails. This is ratcheted and ordinarily drops clear when the workman gets out of the way of the passing train. If he should move so quickly that the drill is forgotten it will clear itself.

The hand method of drilling holes requires the workmen to carry around a heavy piece of iron, called an "old man," for the drill backing. Air drills can be used, but as the signals are operated electrically, the difficulty of supplying compressed air is considerable. It has been suggested that the necessary holes be drilled in the shop, with saving in complication on the road, but this is not really practical because the holes, when drilled in this manner, would be dirty by the time that bonding is to be done. Thus hand reaming would be required, which is as unsatisfactory as drilling on the ground. More time is spent in hand drilling than in the work on any other part of the bonding and one man can drill only from twenty-five to thirty holes by this method in an eight-hour day.

When the contracting engineers installed the bonds on the Pennsylvania Railroad they tested them, but the railroad made no tests of its own until the summer of 1919, although, as noted above, all trackwalkers are instructed to watch for broken bonds, to report these to the electric traction department and to place jumpers around the defective joints. The last-named is essential as the bonds are also used for the signal current. Even with the most careful trackwalkers, however, this inspection is only superficial, as they do not see both sides of each rail and many types of breaks are not noticeable from a standing position.

Usually the first indication of faulty bonding is signal trouble traced to this source. If the section in which there is signal trouble has not been recently tested, bonders must be sent out to the section in trouble to "test" the bonds by eye and by feeling the tightness. The trouble is usually located by using this method, but meanwhile the signals have been in trouble for at least several hours. When signal trouble is located in a section in a scientific manner reference is made to the test reports and these will point to the bond in trouble by showing it up as having tested the poorest in that section.

The "scientific testing" or true bond testing is now being done with an instrument built by the American Steel & Wire Company in conjunction with the Weston Electrical Instrument Company. It is the type ordinarily employed for such testing, comprising essentially a differentially wound milli-voltmeter. By this means the voltage drop across the bonded joint applied to one coil is balanced against the voltage across two points on the rail proper applied to the other, when continuous current is flowing through both sections in series.

Since alternating current is used for traction, a storage battery capable of supplying about 100 amp. to provide the test current must be carried around. Theoretically, of course, an alternating current meter could be used if it were desirable to use alternating current for the testing, but the traction current fluctuates too much to make this practical. The method, like that used by the West Jersey & Seashore Railroad, of sending a small direct current through the rails during the night for testing is not possible here due to the signal transformer connections, which would short circuit the rails through the transformer or cause stray current in the signal operating devices.

The testing party consists of three men carrying an Edison one-cell 80-amp.-hr. storage battery, a milli-voltmeter and appliances for connecting the battery across the points from which conductors are led to the voltmeter. Two points for one coil are at a fixed distance apart and are placed directly above the terminals of the bonds, while a third point, giving the voltage for the differential coil, is movable, and is moved in and out until a balance is obtained, when the length of good rail having a resistance equal to the resistance of the bonded joint can be measured. Each bond tested has its test value recorded and is located for the records by the number of joints east or west of a certain catenary pole number and by the north or south rail of a certain track number.

There are several objections to apparatus of this standard type for railroad work. It is bulky and heavy, but most of all it ties all three men together with the wires, and all three must clear their apparatus for passing trains, even when between two tracks.

This method of testing is extremely slow and, therefore, costly, as is seen by the fact that one testing crew covered only eight miles of four-track line in three months. This, however, was due partly to rainy weather, when testing was omitted, for reasons shown later. One crew is able to test about 250 joints a day. Even the use of the more modern type of tester which does away with the movable point will not reduce this time much, due to the necessity for supplying direct current.

Experience in testing the bonds by the method outlined has brought out several interesting and important

things which, while known to many engineers, are not generally realized.

First, the resistance of any particular joint may vary considerably from day to day, depending on several things. For example, if the bolts on the splice bar are loose the working of the splice bar will sometimes bring bright spots of the steel tightly together. At other times the contact may be so poor as to render the conductance of the steel across the joint negligible. Again, the dampness of the rails has a remarkably important effect on the resistance of the joint. This latter probably can be explained in two ways. Just after a rain a rust will form inside, between the steel surfaces, and will cause high resistance as far as the steel conductance is concerned. This rust wears off rapidly as trains pass over the joint, causing a brightening of the bearing surfaces. Also since the majority of trains over the road are steam trains, the dirt accumulating on the joints will affect materially the resistance with changes in degree of wetness. Probably the former effect is the greater.

The conducting effect of the splice bars is so great that even with both bonds broken the joint may test out as "good." For this reason such testing is not a true indication of the bonding, but only of the momentary resistance of the joint, which may be quite different after the next train passes. It must not be concluded, however, that because this is true such testing is worthless, for if a joint tests bad it proves that something is wrong with the bonds. This is the angle from which testing results must be viewed and not the reverse. Because a bonded joint tests "bad" one day and then "good" the next is no reason to assume that the joint is good and the test in error, for the second time the conductance may have been improved, as shown above, and yet the joint may be subject to "going bad" at any moment.

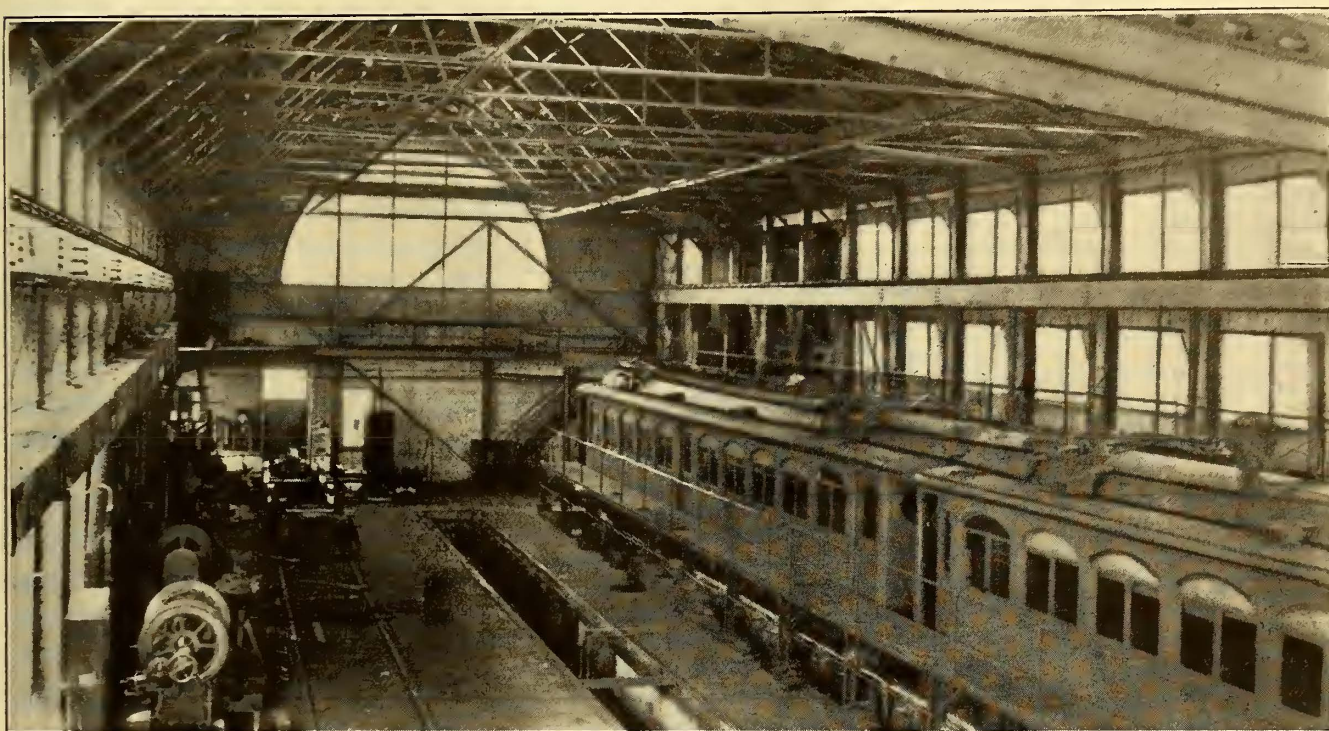
When bonds which tested "bad" were first ordered replaced the men reported that in several instances both terminals were tight and the strands whole, leading to the false impression that the test was in error and the joint well bonded. Although, of course, it cannot be assumed that every test is correct, repeated trials of testing during various stages of removing the old and replacing the new bond indicate that a bond perfectly tight in the rail and unbroken is not necessarily "good."

Two conditions in particular may be found: First, the terminal lug in the rail may be tight in spots, but the metal or the hole may have been dirty when the bond was applied. Second, the soldering in the soldered terminal may have been faulty and the lug may have been struck with a hammer to make the strands tight. This latter is not the fault of the bonders. It is caused by the trackwalkers jamming the strands inside the splice bar bolt when tightening the latter and thereby eliminating the loop left in the strands to provide flexibility. Under this condition it is obvious that any expansion in the rails will cause the strands to pull loose in the soldered terminal. Thus it is evident that tightness of terminals or intactness of strand is not a true sign of good bonding.

In conclusion I wish to express the belief that better methods of bonding for this class of work should be found and a method for daily bond testing developed. And above all, it must be remembered that the problem of bonding on trunk lines is entirely different from that of bonding on street railways.

# Maintenance of Single-Phase A.C. Multiple-Unit Equipment on the Westchester

## Inspection and Maintenance Practice on a High-Speed Suburban Line, Together with Complete Data Covering Costs of Such Inspection and Maintenance



INTERIOR OF WESTCHESTER SHOPS WHERE MULTIPLE-UNIT CARS ARE INSPECTED, OVERHAULED AND REPAIRED

**T**HE New York, Westchester & Boston Railway is a high-speed suburban line operating between Harlem River, New York City, and Mt. Vernon, N. Y., a distance of 10.53 miles, where the line divides, one branch going to New Rochelle, N. Y., a distance of 1.9 miles, and the other to White Plains, N. Y., a distance of 9.23 miles. From Harlem River to West Farms operation is over the tracks of the New York, New Haven & Hartford Railroad and from West Farms to Mt. Vernon the construction is four-track. From Mt. Vernon to both White Plains and New Rochelle the construction is double-track. The system is equipped for single-phase 11,000-volt alternating-current operation, energy being received by means of an overhead pantograph. Operation began in 1912, during which and succeeding years several articles appeared in the *ELECTRIC RAILWAY JOURNAL* describing shop and operating problems and supplying maintenance costs.

The cars used on the Westchester are of steel construction throughout, with general dimension and weights as follows:

Length over buffers.....	72 ft. 7 1/2 in.
Length over sills.....	70 ft. 4 in.
Length over corner posts.....	61 ft. 4 1/2 in.
Widths at eaves.....	9 ft. 9 1/4 in.
Over-all width.....	10 ft. 4 in.
Height from top of rail to top of roof.....	13 ft. 3 1/2 in.
Distance between truck centers.....	47 ft. 7 1/2 in.
Wheelbase.....	8 ft.
Seating capacity.....	80
Weight of motors and control equipment.....	24,450 lb.
Total weight of car.....	120,000 lb.

These cars are equipped with two Westinghouse 6-pole single-phase motors, located both on a single truck. The motors are of the forced-ventilation type and have an hourly rating of 175 hp. each. The motor trucks are equipped with 42-in. steel-tired wheels, while the trailer trucks are equipped with 36-in. rolled steel wheels.

There are forty-five cars in all, including thirty-eight standard cars, such as the one shown in an accompanying illustration; two express cars and five trailer cars. The latter are used only when service requires, which is seldom, and at that time are used in the ratio of three motor cars to one trailer.

The service which these cars are called upon to furnish consists of 119 trains per day between Harlem River and New Rochelle and ninety-two trains per day between Harlem River and White Plains, or 211 trains per day on the main line from Harlem River to Mt. Vernon.

During the off-peak hours single cars are used, but during the rush hours trains are used in length up to a maximum of four cars. The average number of car-miles run on the Westchester during the month of April, 1920, was 4,500.

### EQUIPMENT INSPECTED ON MILEAGE BASIS

The multiple-unit cars are inspected approximately every 3,000 miles. In addition to this inspection there is, of course, the usual terminal inspection at the end

of each run. The cars average about 3,000 miles per month, so that each car receives a general inspection on an average of once every month.

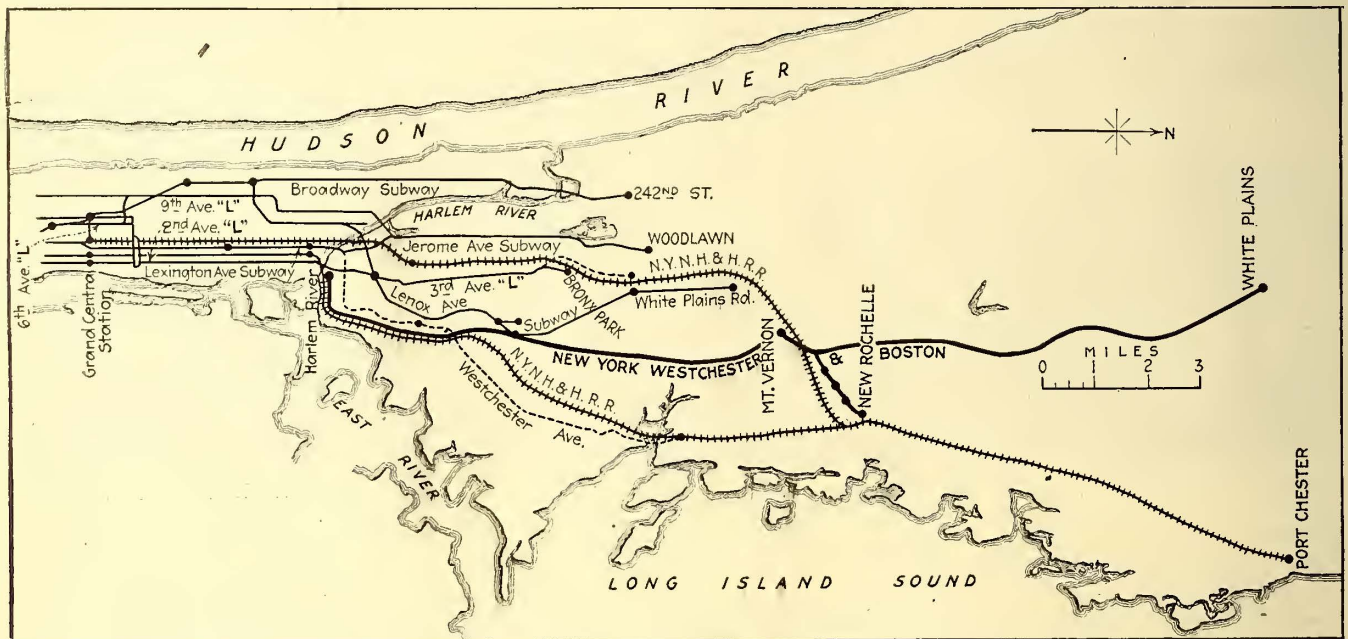
For the general inspection the force is divided up so that certain men specialize on certain parts of the equipment. One man, for instance, is responsible for all oiling. This includes compressor, blower, motor generator, truck journals, axle bearings, armature bearings, truck parts, etc. In addition to this, waste oil from the motor overflow cup is used for lubricating journal box guides and brake rigging slides. Thin graphite grease is used on the center plate bearing at such times as the car is jacked up for general overhauling of the trucks. Hard stick graphite is used on the diaphragm plate at the ends of the cars, being rubbed on the high spots as well as on parts that show where the plates have been in contact.

A second man specializes on the trucks. These are carefully inspected for looseness of any parts, brake shoes are replaced if worn and brakes are adjusted,

run until the operation indicates that it needs attention. This in some cases has been as long as eight years.

There is no time at which the entire car receives a general overhauling. This is done on an installment plan at the time of the general inspection, as experience has shown that certain parts need a general overhauling more frequently than others. For instance, the truck receives a general overhauling at such time as the wheels need turning. This is approximately every 40,000 miles on the trailer trucks and every 30,000 miles on the motor trucks. The motor truck mileage between overhauling dates would be approximately the same as that for the trailer trucks except for the fact that it has been found cheaper to turn the wheels on the motor trucks and overhaul the trucks at the same time the motor is overhauled. This has been found to approximate every 30,000 miles.

When the truck is to receive a complete overhauling the car is lifted from the truck by means of a yoke attached to the overhead crane, as shown in an accom-



MAP OF THE NEW YORK, WESTCHESTER & BOSTON SYSTEM, SHOWING ALSO NEW YORK CITY CONNECTING RAPID TRANSIT LINES

wheels are gaged to show wear and are removed for turning when necessary. The inspection work on the motor is done by a third man, who notes the condition of the commutator and of the brushholders and replaces any worn brushes. Any dirt in the motor is blown out by compressed air. The same inspection is also given to the blower motor, the air compressor motor and the motor generator. All control apparatus is carefully inspected by a fourth man. This includes the switch group, reverser, various relays, train coupler sockets and jumpers. These parts are adjusted and worn parts are replaced and finally the whole is tested for proper operation.

One man inspects, lubricates and replaces any worn parts, including shoes, on the pantograph and finally tests this for operation. Another inspects the car body, adjusts, replaces and repairs sash, seats and doors. A third handles the inspection of the air brake equipment, removing and replacing with cleaned and tested parts those that are due for periodic cleaning. This includes compressor governors, feed valves, brake valves and control valves. The air compressor itself is allowed to

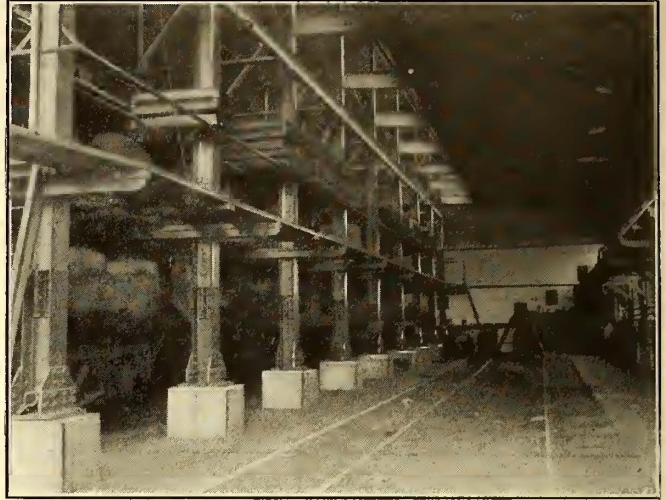
panying illustration. The heavy fabricated supports shown are then released, by removing a pin, and drop into position under the car sills. The car is lowered onto these and the yoke removed. Both this track and the adjoining one are furnished with a hand-operated turntable of diameter sufficient to accommodate a single truck and so located that when the car is resting on the supports the truck is centered on the turntable.

The turntable is revolved 90 deg. and a chain from the crane hoist is attached to the truck. In this way it is drawn from under the car and placed on the turntable of the adjoining track, whence it can be drawn by the crane to a convenient point for overhauling. The reverse operation of replacing the truck is accomplished in the same manner. This plan eliminates heavy pushing and pulling by the workers; in fact, two men on the floor and one crane operator can handle the operation very satisfactorily.

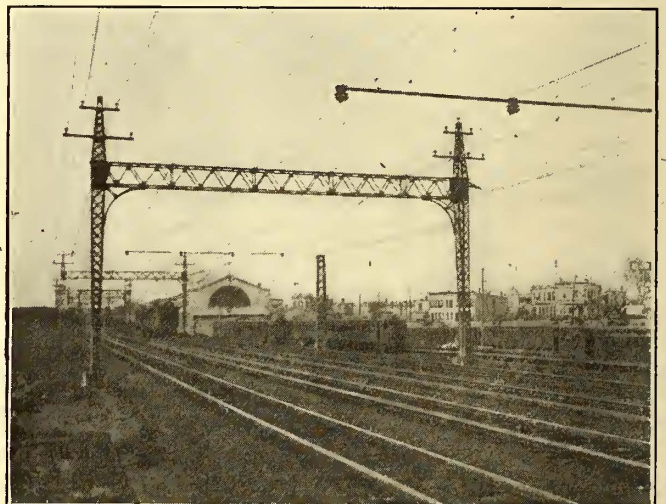
At the time the motor is overhauled the commutator is turned and undercut, brushholders taken out and worn ones replaced and reset to the proper tension. Fields are inspected for their condition and blown out thor-



### Typical Views in the Shops and Elsewhere on the New York, Westchester & Boston Railway Property

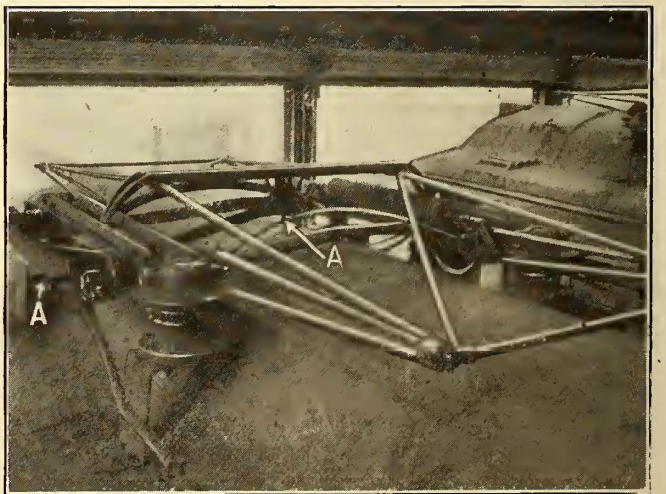
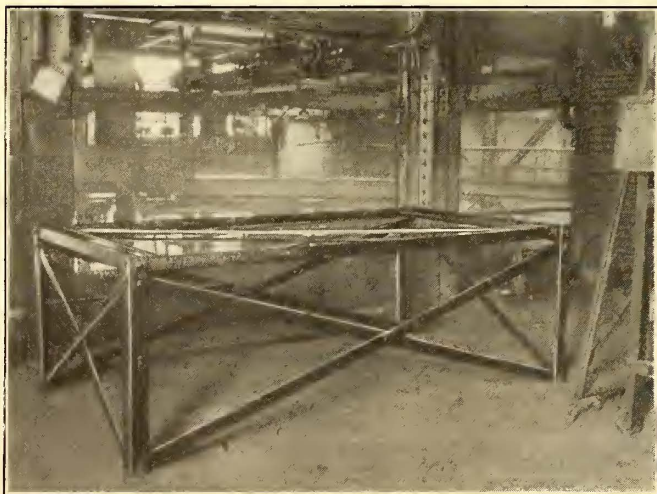


AT LEFT, THE AIR BRAKE DEPARTMENT IS LOCATED ON THE NORTH BALCONY. AT RIGHT, INTERIOR OF TWO-TRACK PAINT SHOP, SHOWING PERMANENT PLATFORMS AND RACKS FOR STORAGE OF SEAT CUSHIONS AND BACKS



INTERIOR OF WESTCHESTER STANDARD MULTIPLE-UNIT CAR, SHOWING PRESENT LIGHTING

MAIN FOUR-TRACK RIGHT-OF-WAY, WITH SHOPS AND STORAGE TRACKS AT THE RIGHT



AT LEFT, JIG USED TO SQUARE UP PANTOGRAPHS DURING ASSEMBLY. AT RIGHT, EACH SIDE OF THE PANTOGRAPH FRAME HAS ONLY ONE CROSS BAR. NOTE ALSO THE SPECIAL DEVICE "A" FOR MANUALLY UNLOCKING THE PANTOGRAPH

TABLE I—MAINTENANCE COSTS OF MULTIPLE-UNIT CARS N. Y., W. & B. RY., 1919

	Repairs—Labor and Material												Average
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
A.C. equipment	\$365.14	\$773.00	\$404.89	\$608.93	\$593.94	\$399.14	\$351.46	\$394.05	\$353.37	\$443.49	\$856.22	\$936.75	\$540.36
Motors.....	491.29	474.23	531.72	802.15	849.16	610.39	635.67	448.71	408.57	498.94	375.59	812.15	578.21
Control equip- ment.....	84.81	47.37	51.22	51.35	-276.72	252.03	235.32	107.66	190.02	55.03	128.29	121.21	133.42
Car body.....	480.13	309.17	725.57	325.47	383.66	621.54	644.71	577.63	406.30	352.91	383.96	601.35	484.37
Trucks, wheels and axles....	694.49	517.79	606.36	1,422.70	1,416.92	1,076.50	1,342.24	981.58	742.09	576.74	542.93	611.10	877.62
Gears and pin- ions.....	3.03	3.52	26.32	58.59	112.22	8.83	44.39	128.39	49.68	9.09	77.91	72.54	49.54
Pantographs...	266.18	189.24	161.68	125.68	172.76	252.09	95.95	229.87	139.78	176.19	317.90	551.90	223.27
Air brakes.....	145.84	146.35	66.53	124.47	191.74	226.09	245.14	402.37	285.04	260.56	160.54	295.31	212.50
Brake shoes....	282.00	201.00	283.50	250.50	172.50	255.29	454.90	396.22	258.21	269.14	334.57	372.03	291.66
Miscellaneous shop expense and super- vision.....	646.66	546.95	659.93	479.97	441.79	486.45	468.50	442.49	461.92	707.30	564.74	773.24	581.66
Total.....	\$3,459.57	\$3,208.62	\$3,517.72	\$4,249.81	\$4,611.41	\$4,188.35	\$4,518.28	\$4,108.97	\$3,294.98	\$3,349.39	\$3,742.65	\$5,147.58	\$3,972.61
Cost (cents per car-mile)....	2.66	2.76	2.68	3.24	3.30	2.98	3.14	3.53	2.45	2.43	2.70	3.66	2.96
	Inspection—Labor												
A. C. equipment	42.65	32.87	36.67	37.84	58.75	42.98	77.38	59.59	69.76	60.45	60.92	85.26	54.59
Motors.....	79.32	72.46	71.02	65.26	62.14	56.52	72.59	69.78	99.73	83.38	96.11	116.08	78.70
Control equip- ment.....	35.34	19.17	8.08	25.07	10.91	10.18	25.01	50.10	39.71	46.01	22.17	18.70	25.87
Car body.....	62.54	45.66	54.87	60.08	48.54	40.38	58.65	59.52	96.74	86.13	48.30	53.60	58.75
Trucks, wheels and axles....	3.88	0.48					0.95		4.10	9.49	6.74	25.35	4.33
Gears and pin- ions.....													
Pantographs...	78.87	67.61	68.12	63.69	57.45	64.18	70.22	84.94	92.60	64.17	55.52	41.20	66.55
Air brakes.....	77.41	58.78	50.46	65.00	71.31	51.71	81.85	70.81	134.77	126.37	78.66	63.86	78.42
Brake shoes....	45.93	54.64	61.27	56.47	55.53	53.14	64.00	44.01	105.06	131.02	93.40	136.81	75.11
Miscellaneous shop expense and super- vision.....	53.25	53.44	53.44	53.44	53.44	53.44	59.37	59.37	107.51	65.30	81.03	80.58	64.47
Total.....	\$479.19	\$405.11	\$403.93	\$426.85	\$418.07	\$372.53	\$510.02	\$488.12	\$749.98	\$672.32	\$542.85	\$621.44	\$506.79
Cost (cents per car-mile)....	0.37	0.35	0.31	0.33	0.30	0.26	0.35	0.42	0.56	0.49	0.39	0.44	0.38

NOTE.—Costs of car cleaning, lubricating materials and incandescent lamps not included in above.

The lighting arrangement in the original cars has also been changed, the forty-two 23-watt side lights having been removed and ten 56-watt lamps with shades having been placed along the center of the car.

Since the construction of the shop proper, a two-track paint shop addition has been built. One man devotes his entire time to the painting, continually keeping one car going through the shop. This results in the painting of each car approximately every eighteen months.

When cars are brought in for a periodic painting all seat backs and cushions, lamps and shades are removed. The car is blown out with compressed air and all window sash are removed. The ceiling is washed down with a solution of soap and water in which is included a small amount of alcohol. The inside of the car is sandpapered, following which the ceiling receives a coat of white enamel and the interior walls are painted with an interior enamel. Seats and cushions are cleaned with a renovator and replaced. This also applies to the curtains.

The exterior of the car is cleaned with Exlo emulsion and the roof is scraped and painted. The pantographs are also painted. The sides of the car are then cleaned

with steel wool and painted with a New York, Westchester & Boston standard enamel. The sash is burned off on the outside and painted. The inside is cleaned and varnished.

As the car goes through the paint shop the door engines, of which there are six per car, are overhauled. All equipment under the car is given a coat of black paint and the rubber matting in the vestibule is replaced if badly worn.

As compared with the figures presented in the ELECTRIC RAILWAY JOURNAL of March 21, 1914, the accompanying tabulation of maintenance costs will show considerable increase, but this has not been out of proportion to increases in the cost of all other materials and work, and in fact the accompanying figures make a very favorable showing.

The total costs of maintenance are shown in Table I, being divided under the heads "Repairs" and "Inspection." The costs for repairs include both labor and material, while those for inspection naturally include a labor charge only. None of these figures include the cost of car cleaning, lubricating materials and incandescent lamp renewals. The cost for "A.C. Equipment"

TABLE II—DELAYS AND MINUTES DELAY TO MULTIPLE-UNIT CARS CHARGEABLE TO DEFECTS IN VARIOUS PARTS OF EQUIPMENT, 1919

	—Brakes—		—A.C. Equip.—		—Cont. Equip.—		—Panto.—		—Misc.—		Total [Delays]	Total Min. Delay	Pass. Car- Miles per Delay	Pass. Car- Miles per Min. Delay	Cars Removed from Service	Total Passenger Car-Miles
	No.	Min.	No.	Min.	No.	Min.	No.	Min.	No.	Min.						
January.....	7	21	2	6	1	12	0	0	3	13	13	52	9,983	2,496	8	129,780
February.....	5	20	3	20	3	7	0	0	4	30	15	77	7,742	1,508	14	116,136
March.....	6	19	3	9	0	0	0	0	8	25	17	53	7,716	2,475	7	131,165
April.....	2	6	2	5	1	3	0	0	0	0	5	14	26,243	9,373	9	131,216
May.....	2	10	2	13	5	23	0	0	2	6	11	52	12,674	2,681	8	139,418
June.....	6	43	2	11	3	22	0	0	1	7	12	83	11,708	1,704	8	140,499
July.....	2	11	2	12	1	4	0	0	2	14	7	41	20,512	3,502	8	143,587
August.....	3	24	1	4	5	28	0	0	1	6	10	62	11,630	1,876	5	116,309
September.....	5	30	0	0	3	44	0	0	3	20	11	94	12,219	1,429	6	134,405
October.....	2	18	4	21	1	16	0	0	1	6	8	61	17,209	2,254	4	137,594
November.....	3	12	4	26	0	0	0	0	4	39	11	77	12,605	1,800	11	138,663
December.....	4	23	6	68	0	0	0	0	1	8	11	99	12,772	1,419	6	140,490
Totals.....	47	237	31	195	23	159	0	0	30	174	131	765	163,013	32,517	94	1,599,262
Av. per month....	3.91	19.6	2.58	16.2	1.91	13.2	0	0	2.5	14.5	11	64	13,584	2,710	8	133,272

NOTE.—Thirty-eight cars in service.

includes all a.c. wiring, the blowers, the transformers and the switch groups. Costs for control equipment cover all direct-current apparatus, such as the batteries and the direct-current side of the switch group and control. The total cost of maintenance and inspection expressed in cents per car-mile for the year 1919 was 3.34 cents.

In Table II are shown the number of delays and the number of minutes delay to multiple-unit cars chargeable to defects in various parts of the equipment. The column "Cars Removed from Service" does not indicate that these cars necessarily broke down on the road, but simply that some defect was discovered which made it advisable to turn the car into the terminal for inspection at either end of the run. The figures in this table show that there was an average of only eleven delays per month, totaling sixty-four minutes per month, or less than six minutes per delay. It is also shown that there were 13,584 car-miles operated for every delay.

Table III shows the defects in any part of the car equipment reported by motormen during the year 1919. This table is made up from a monthly car defect report,

which is analyzed carefully. It should be explained that the recorded defects in pantographs include all reports of slow operation, etc., made by the motorman, and this does not mean that the pantographs were broken or failed to operate.

Table IV shows the number of replacements of various equipment parts for the multiple-unit cars during the year 1919. The replacement of car lamps might at first seem high, but when it is recalled that there are forty cars in continuous operation, requiring 410 lamps, it will be seen that the replacement of an average of 58.5 lamps per month, or 15 per cent, is in reality very small.

Table V shows the number of replacements and the mileage of brake shoes, pantograph shoes and main motor brushes during 1919. The number of pantograph shoes used and the mileage obtained from each is noticeable as compared with some of the early years of operation. This is to be attributed to the fact that the steel contact wire has now worn down so that the surface is flat and thus does not present a single narrow line of contact. The wearing surface is now approxi-

TABLE III—CAR DEFECTS REPORTED BY MOTORMEN IN 1919, N. Y., W. & B. RY.

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Compressors.....	1	3	0	0	0	1	1	1	0	1	1	1	10
Governors.....	3	2	1	0	1	1	1	0	2	1	2	1	15
Control valves.....	0	0	1	0	0	0	0	0	0	2	0	0	3
Brakes leak off.....	0	0	0	0	0	0	0	0	0	0	0	0	0
Stuck brakes.....	4	4	1	5	2	4	0	0	0	0	0	0	22
Electric brakes.....	0	1	0	0	0	0	0	0	0	1	0	0	2
Feed valves.....	2	1	1	0	0	2	0	0	1	0	2	1	10
Brake valves.....	2	0	0	0	0	0	0	0	1	0	0	0	3
Brake release slow.....	0	0	0	0	0	0	0	0	1	0	0	0	1
Poor brakes.....	1	3	1	1	1	0	0	0	3	2	0	0	12
Emergency valves.....	0	1	0	0	0	0	0	0	1	0	0	0	2
Whistles.....	0	1	0	1	0	0	0	0	0	0	1	0	3
Air pipes.....	1	0	0	0	0	0	0	0	0	0	0	0	1
Angle cocks and hose.....	1	1	0	0	0	2	1	1	4	0	0	0	10
Line switch.....	0	1	0	1	0	1	1	1	0	0	0	0	5
A.C. wiring.....	0	0	0	0	3	0	3	0	0	1	0	0	7
Transformers.....	0	1	1	0	0	0	1	0	0	0	1	0	4
Control wiring.....	1	0	0	0	0	0	0	0	0	0	0	1	2
Current relay.....	0	0	0	1	1	1	2	0	4	0	1	1	11
Jumpers and sockets.....	0	1	0	0	1	1	1	1	2	0	0	0	7
Switch group.....	0	3	1	1	2	1	0	3	2	2	1	2	18
Switches.....	1	2	0	0	1	0	1	0	0	1	1	1	8
Lights.....	0	1	0	0	0	0	0	0	0	0	0	0	1
Battery lights.....	0	0	0	0	0	1	0	0	0	0	0	0	1
Motor leads.....	0	0	0	0	0	0	0	0	0	0	0	0	0
Pantographs.....	11	8	7	2	15	16	12	8	10	14	11	9	123
Batteries.....	0	0	0	1	0	2	1	0	2	1	0	1	8
Heaters.....	2	3	2	0	0	0	0	0	0	0	2	0	9
Motor generators.....	0	0	0	3	0	1	3	0	1	3	0	1	12
Reverser.....	0	0	0	0	0	0	0	1	1	1	0	1	4
Motors.....	8	13	12	9	3	4	1	2	3	5	6	3	69
Blower.....	2	1	1	1	0	0	0	0	1	1	0	0	7
Flat wheels.....	1	4	0	0	0	0	0	0	0	1	0	0	6
Hot journals.....	0	0	1	3	2	0	3	1	4	1	1	2	18
Hot motor bearings.....	0	0	0	0	0	0	0	2	0	1	0	0	3
Gears.....	0	0	0	0	0	0	0	0	0	2	0	0	2
Doors.....	3	3	2	2	3	0	3	4	4	1	3	3	38
Glass.....	0	0	0	1	1	2	0	0	3	0	1	0	8
Car seats.....	0	0	0	0	0	1	0	0	2	1	2	1	7
Trucks.....	1	2	0	0	0	2	2	0	2	4	5	3	21
Leaky roofs.....	0	0	1	0	0	0	1	0	0	0	0	0	2
Cars uncoupled.....	1	1	0	0	0	0	0	0	0	0	0	0	2
Shop.....	0	1	0	0	0	0	0	0	0	0	2	0	3
Motormen.....	0	0	0	0	2	0	0	0	0	0	1	0	3
Miscellaneous.....	3	6	5	2	3	2	1	8	5	3	3	5	46

TABLE IV—REPLACEMENT OF EQUIPMENT PARTS FOR MULTIPLE-UNIT CARS IN 1919, N. Y., W. & B. RY.

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Controller and interlock fingers.....	0	51	65	30	87	0	0	30	86	25	30	6	410
Switch group contact tips.....	8	40	44	63	32	54	36	66	68	28	34	30	503
Reverser fingers.....	3	0	0	0	0	0	0	0	13	0	0	0	16
Resistance grids.....	0	15	0	0	8	17	0	21	3	3	12	8	87
Switch group unit switches.....	1	0	13	2	0	0	0	0	6	7	7	1	37
Canvas blower connections to motors.....	0	0	00	14	0	6	0	6	0	0	0	0	26
Air brake hose.....	12	6	0	0	12	0	14	39	48	0	0	0	131
Line switch contacts.....	0	0	0	0	0	16	35	0	0	0	0	0	51
Brushholders.....	0	0	0	6	0	6	0	0	6	6	12	0	36
Heater coils.....	0	0	0	0	0	0	0	0	0	0	0	3	3
Pantograph insulators.....	0	1	1	0	3	2	0	2	0	0	6	0	15
Pantograph air hose.....	3	0	0	0	0	0	0	0	0	0	7	0	10
Battery lamps.....	85	20	10	25	30	0	15	10	10	14	0	0	209
Car lamps.....	85	70	120	40	57	45	20	45	60	30	65	80	717
Headlights.....	0	0	0	0	0	0	0	0	0	0	0	0	0
Gage lights.....	0	6	0	0	0	12	0	0	0	0	0	0	18
Motor bearings.....	0	0	0	0	0	0	0	0	0	0	0	0	0
Journals bearings.....	1	0	0	0	0	0	0	0	0	0	0	0	1
Gears.....	0	0	0	0	0	0	0	1	0	0	0	0	1
Pinions.....	0	0	0	2	2	0	0	2	0	0	1	0	7
Solid wheels.....	12	0	0	0	0	2	16	0	0	0	0	0	30
Tires.....	0	4	4	12	12	4	0	8	6	4	2	2	58

TABLE V—REPLACEMENTS AND MILEAGE OF BRAKE SHOES, PANTOGRAPH SHOES AND MAIN MOTOR BRUSHES FOR 1919, N. Y., W. & B. RY.

	Brake Shoes		Pantograph Shoes		Motor Brushes	
	No.	Miles per Shoe	No.	Miles per Shoe	No.	Miles per Brush
January.....	188	8,974	65	2,019	1,600	3,936
February.....	134	11,267	76	1,547	1,400	3,982
March.....	189	9,022	96	1,380	1,300	4,843
April.....	167	10,214	52	2,554	1,100	5,726
May.....	115	15,760	45	3,136	950	7,044
June.....	145	12,596	38	3,743	550	12,262
July.....	282	6,619	60	2,409	650	10,603
August.....	200	7,560	51	2,282	400	13,957
September.....	162	10,895	58	2,341	450	14,482
October.....	170	10,632	61	2,280	750	8,898
November.....	193	9,434	70	2,013	850	7,957
December.....	213	8,685	80	1,779	900	7,591
Totals.....	2,158	121,658	752	27,483	10,900	101,281
Average per month.....	179	10,138	63	2,290	908	8,440

TABLE VI—COMPARISON OF MISCELLANEOUS AVERAGES OF VARIOUS ITEMS FOR YEARS 1913-1919, N. Y., W. & B. RY.

	1913	1914	1915	1916	1917	1918	1919
Total cost, inspection and repairs.....	\$1,820.04	\$2,032.00	\$2,044.85	\$2,363.95	\$2,168.42	\$2,835.25	\$4,457.24
Cost per-car mile, inspection and repairs (cents).....	1.53	1.68	1.62	1.73	1.65	2.19	3.34
Total cost, repairs only.....	1,350.79	1,615.84	1,768.11	2,094.37	1,853.78	2,419.58	3,949.75
Cost per-car-mile, repairs only (cents).....	1.13	1.35	1.41	1.53	1.41	1.87	2.96
Miscellaneous carhouse expenses.....	417.39	767.52	747.22	799.26	520.60	476.11	813.25
Cost lubrication per 1,000 car-miles (cents).....	0.21	0.22	0.23	0.17	0.20	0.19	0.31
Car-miles.....	118,975	120,471	126,213	136,695	130,934	129,182	133,272
Delays.....	5.05	3.50	4.30	7.2	5.50	8.0	11.0
Minutes delay.....	43.7	25.5	25.7	38.7	30.5	64.0	64.0
Kilowatt hours per car-mile.....	4.94	4.86	4.68	4.84	4.65	4.77	5.10

NOTE—Miscellaneous carhouse expenses contain the cost of car cleaning, lubrication, incandescent lamps, etc.





TYPICAL FOUR-MOTOR CAR TRAIN READY FOR RUSH HOUR SERVICE

mately the diameter of the wire. This results in considerably less wear on the shoes and consequently fewer shoes are used per month. On the other hand less mileage has been obtained from motor brushes. This is due to increasing severity of service requirements.

Table VI shows a comparison of miscellaneous averages of various items for the years 1913 to 1919. This table shows very clearly the effect of increased cost of materials and labor. The column "Miscellaneous Carhouse Expenses" includes the cost of car cleaning, lubrication, incandescent lamps, etc., not included in Table I. Car cleaning includes two general cleanings during the month as well as interior washing and disinfecting. In addition to this all cars are dry swept and brushed every day, the windows being dry cleaned.

### Government Increased Wages

**D**URING the testimony of Director-General Hines before the committee on appropriations of the House of Representatives the Director-General was asked to explain the widespread difference between wages under private control of interurban railways and when they were being operated by the federal government. As examples were cited four interurban lines using electricity as motive power. Two were under federal control and two were under private control. The former two roads were the Waterloo, Cedar Falls & Northern and the Fort Dodge, Des Moines & Southern. The two under private control were the Cedar Rapids & Iowa City Railway and the Clinton, Davenport & Muscatine Railway. A study of these four railways, which were operated under similar conditions, brought about the accompanying tabular analysis.

Mr. Hines contended that standardization of wages throughout the country on the railroads resulted in important economies despite the fact that wages were raised in certain sections of the country. He took issue

with the figures in the tables submitted by Representative Good. He later added to his testimony the following note:

While an investigation is being conducted into the details of the salaries and wages mentioned, a report received by the Director-General, Mr. Hines, from C. D. Cass, general manager of the Waterloo, Cedar Falls & Northern Rail-

#### COMPARISON OF SALARIES AND WAGES, 1919, FEDERAL AND PRIVATE CONTROL OF INTERURBAN RAILWAYS.

Class of work.	Private control	Federal control	Per cent of increase of Federal control over private
Small-station attendants, per month...	\$90.00	\$120.00	33.33
Motormen, per hour.....	0.50	0.75	50.00
Conductors, per hour.....	0.50	0.75	50.00
Freight-service employees, per hour....	0.55	0.76	38.18
Clerks, per month.....	95.00	100.00	5.26
Section men, per month.....	0.32	0.40	25.00
Bridge repair men, per month.....	0.32	0.53	65.63
Superintendent, substation, per month..	165.00	530.00	221.21
Blacksmiths, per hour.....	0.45	0.72	60.00
Electricians, per hour.....	0.50	0.72	44.00
Carpenters, per hour.....	0.50	0.72	44.00
Car inspectors, per hour.....	0.45	0.67	48.89
Laborers, per hour.....	0.33	0.40	21.21

road, the property mentioned as having been under federal control, is to the effect that during 1919 there was no superintendent of substation on the property drawing \$530 per month and, in fact, that there was no official or employee on the property drawing that amount, the highest salary of any officer or employee having been paid to Mr. Cass as general manager and that being \$6,000 per annum. Prior to federal control Mr. Cass received \$12,000 per annum. If possible, a communication will be sent by the Director-General to the chairman later concerning the details of the other wages given in the table presented by the chairman.

Mr. Good refuses to be shaken from his claim, as he supplements Mr. Hines' note with the following:

Attention is called to the fact that an examination of the detailed information upon which the comparative table in question is based shows that substation operator pay per month on the Fort Dodge, Des Moines & Southern Railway was \$120 per month under private control (1917) and reached a maximum of \$530 per month (1919) under Federal control.

# Design, Maintenance and Operation of Electric Rolling Stock

A Comprehensive Symposium of Papers Read at the A. R. A. Mechanical Section Convention at Atlantic City on June 10 Epitomizes Present Practice in This Field

AT THE Atlantic City meeting of the Mechanical Section, American Railroad Association, begun this week, the committee on electric rolling stock, C. H. Quereau, New York Central Railroad, chairman, on June 10 presented as its report a symposium covering operating experiences and general data of most of the steam railroad electrifications in the country. Brief abstracts of some of the papers forming this symposium are given below:

## A PIONEER ELECTRIFICATION

J. H. Davis, electrical engineer Baltimore & Ohio Railroad, reported for that road in respect to the Baltimore tunnels. The class LE-2 locomotives, although of obsolete design, are still in operation and are today handling the maximum tonnage freight trains over the division, notwithstanding the fact that while they have been in service steam motive power has been replaced twice in order to secure greater capacity. Their continuance in service is due to the flexibility of multiple-unit control in that they are now used in a three-unit combination, whereas they were originally in a two-unit combination.

The locomotives purchased in 1910 and 1912 are of the Detroit tunnel type and can be considered as standard for the present electrification. Future additions probably will be of this type, with minor modifications to increase capacity slightly. These will involve increasing weight to 120 tons and changing the gear ratio to 83:19, which will give tractive effort at the one-hour rating of 33,800 lb. with a speed of 12.2 m.p.h. This will permit handling maximum-tonnage freight trains (2,600 tons, including steam locomotives) without dangerous overloading.

After a number of contact conductor arrangements had been tried out, of which Mr. Davis gave details, the present standard construction, he said, was adopted. In this the insulator rests on a wood-block support, eliminating the use of any metal except for the fastening bolt. The guard boards are supported on a malleable iron casting, but this is mounted independently from the insulator support. When the new construction was first installed there was some apprehension lest it might be pushed over the insulator on curves due to the effect of creepage and expansion. Anchors, however, have not been found necessary, although the rail is laid on a maximum grade of 1 per cent and is subjected to heavy traffic conditions.

As to bonding, Mr. Davis reported that the original bonds of an early concealed type with compressed terminals had short life and have been replaced by bonds of cable type extending around the joint plates. These are of 500,000-circ.mil section, 43 in. in length, with expanded pin terminals. With 130-lb. track rail now being laid a cable bond passing under the joint plates is being used, with terminals at both ends applied at

the factory. While joint plates must be removed in installing this bond, it is shorter than the other, and increased life is expected because a bond placed outside of the plate is sometimes injured during replacement of ties, etc. Bonds applied to the head of the rail have been tried, but none has proved satisfactory for heavy traffic conditions.

## RESULTS OF THE NEW YORK CENTRAL ELECTRIFICATION

C. H. Quereau, superintendent of electrical equipment New York Central Railroad, gave operating and other data regarding its electrified section. He traced briefly the history of the development, including the reasons for adopting electricity, giving among other things the following dates: First scheduled multiple-unit train, Dec. 11, 1906; first scheduled electric-locomotive train, Feb. 13, 1907; first switching service, April 14, 1907, and all scheduled trains July 1, 1907. Operation began with thirty-five locomotives and 180 multiple-unit cars, of which fifty-five were trailers. It

TABLE I—INSPECTION AND REPAIRS OF ELECTRIC LOCOMOTIVES

Year	Cost per 1,000 Miles		
	Labor	Material	Total
1912.....	\$18.88	\$14.60	\$33.22
1913.....	19.82	14.54	34.36
1914.....	21.55	21.34	42.89
1915.....	19.01	13.79	32.80

was later found important to have all multiple-unit cars equipped with motors, which was done. At present there are seventy-three locomotives and 241 motor cars.

To indicate the reliability of electric operation, Mr. Quereau stated that in 1918 there were thirty-seven detentions of electric locomotive trains and 50,127 miles were run per detention, and seventy-one detentions with the multiple-unit cars, or 83,469 miles per detention. In 1908, under steam operation, on the Hudson passenger division the figures were 664 detentions and 6,045 miles per detention.

The cost of inspection, repairs and maintenance of the electric equipment, as given by Mr. Quereau, are shown in Table I, which figures, he states, are fair averages for the twelve years of electric operation until 1918, when wages were appreciably increased by the government. These figures do not include fixed charges. Table II was given to show the relative numbers of steam and electric locomotives required.

TABLE II—ENGINES USED—HUDSON DIVISION

	Steam		Electric	
	53 Engines and 78 Coaches	17 Engines and 97 Multiple-Unit Cars	41 Engines and 95 Coaches	11 Engines and 116 Multiple-Unit Cars
	Harlem Division			
	Switching Crews			
At G. C. T.....	16 crews	11 engines	11 crews	5 engines
At Mott Haven.....	20 crews	14 engines	12 crews	6 engines
Total.....	36 crews	25 engines	23 crews	11 engines
Shop crews.....	26 crews	20 engines	18 crews	12 engines
Total.....	62 crews	45 engines	41 crews	23 engines

Summarizing the electrification situation in the United States, Mr. Quereau directed attention to these facts: There are fourteen roads which have electrified divisions, on eleven of which there are tunnels; 925.37 miles of route and 1,906.05 miles of track have been electrified; of the seven roads using direct current, four are 600-volt, two 2,400-volt and one 3,000-volt; of the alternating current roads four, with single-phase equipment, use a voltage of 11,000, one road uses three-phase current at 6,600 volts, and one uses single-phase current at 11,000 volts with split-phase current on the locomotive; on five roads third rail is used, and on eleven there are overhead contact wires.

#### REGARDING THE NEW HAVEN

The situation regarding the New Haven electric rolling stock was reported by W. L. Bean, mechanical assistant. He stated that on the principal electric division (New York to New Haven) there are now 104 electric locomotives and twenty-seven multiple-unit and fifty-two trailer cars. All operate at 11,000-volt, single-phase and some are arranged to operate also at 660-volt direct current.

Mr. Bean divided the locomotives of the New Haven into two groups, standard types and experimental types. Of the former he referred to the one using gearless motors for fast passenger service, the first type built, which is now obsolete for single phase. The second standard type comprises the geared passenger, freight and switcher locomotives, respectively with these wheel arrangements, 2-6-2-2-6-2, 2-4-4-2 and 0-4-4-0. Of the experimental locomotives he mentioned the geared three-truck fast freight or passenger locomotives, 2-4-4-2; the geared two-truck fast freight or passenger locomotives, 2-4-4-2; the geared side-rod freight locomotive, 4-4-4-4, and the side-rod locomotives, 2-4-4-2.

The type that proved best for passenger and freight service is the geared type with twin motors; that is, two motors bolted together and driving one pair of wheels through helical springs. This type is now standard. For switcher service the same general type is standard, except that a single motor and an 0-4-4-0 wheel arrangement are used, better to adapt the locomotive for this purpose. Increased switcher power will be obtained by multiple operation of units.

Mr. Bean pointed out that in addition to standardizing the locomotive, the railroad has brought about a corresponding standardization of auxiliary and control apparatus, a few of the major instances being as follows: (1) Standard motor for freight and passenger service; (2) universal blower motor, applicable to all classes; (3) universal compressor motors; (4) standard pantograph; (5) standard line switch, and (6) many detail parts of control apparatus and switch groups not interchangeable as a whole.

Mr. Bean divided the multiple-unit cars into two groups; those operating on 11,000 volts, single-phase only, and those operating on both single-phase and direct current. There are six motor cars of the former and twenty-one of the latter types. Each can pull two trailers. There are fifty-two trailer cars. Of the twenty-seven motor cars but two are now equipped with automatic control, although originally eight were so equipped. The six cars built for alternating current only have straight alternating-current motors, the control being arranged to change the connection of the motor as the speed varies to obtain best commutation. Four of the first motor cars were equipped with a flexible drive

similar to that used on the gearless locomotives. Fourteen later ones came with the helical-spring drive. The last four cars were built with flexible gears, and all motor cars were later changed to these gears. The flexible gear produces easier riding and a simpler design and conduces to easy maintenance. The development has been toward replacing existing apparatus with that of larger capacity, so that an increased tonnage rating can be secured or a greater daily mileage.

The installation of larger units involves rearrangement of apparatus so that a considerable change in appearance results due to but a small modification in design.

#### THE ONLY THREE-PHASE ELECTRIFICATION IN THIS COUNTRY

William Kelly, general superintendent of motive power Great Northern Railroad, described the electrification of the Cascade Tunnel and Tye Yards, commenced in 1908 and completed in 1909. There are here four three-phase locomotives, power being taken from two overhead contact wires at 6,600 volts and transformed on the locomotive in two three-phase transformers to 500 volts. All motors are of the three-phase induction type and the control is of the Sprague multiple type.

The locomotives weigh 115 tons each, all driving wheels being traction wheels and each motor being coupled to its axle like a street car motor. The motor shaft has a pinion on each end, with nineteen teeth, the driving gears having eighty-one teeth. Although the gear is not cushioned to equalize tooth pressure, both pinions wear evenly, the tooth pressures appear to be uniform and the wear to date has been almost negligible.

The four motors are of 250 nominal horsepower each, but can carry 50 per cent overload for the short periods that the railroad is able to use them continuously. The regenerative control is used, but this feature, Mr. Kelly said, has proved of practically no value to the Great Northern.

As to maintenance, the railroad has a one-stall locomotive shed, where periodical inspections are made as well as all repairs except turning of tires, which is done at the Delta shop, 76 miles away. A crew of four electricians is necessary, but this same crew could take care of much more equipment.

Mr. Kelly gave the following data on cost of operation: Repairs per locomotive-mile, \$7.53; wages, \$27.39; lubrication, \$0.20; supplies, \$0.33; total \$35.45. The mileage per pint of cylinder oil is 313; per pint of car oil, 19; the average gross tons per engine-mile, 345; the average tonnage per train, 1,035, as three locomotives are used; the total passenger-car miles, 48,096; the total ton-miles, 8,461,770. These data are for the year 1918.

#### ANOTHER SINGLE-PHASE ELECTRIFICATION

The Hoosac Tunnel electrification was covered by L. C. Winship, electrical superintendent. This 7.9-mile tunnel electrification was undertaken primarily to increase the capacity of the tunnel and to eliminate smoke. With electric operation, which began in May, 1911, four Mallet locomotives used for helper service were diverted to other uses and electric helping locomotives were provided for all trains. The original electrical equipment comprises five a.c. locomotives of the 2-4-4-2 type, developing 51,000 lb. tractive effort as a maximum—20,500 lb. continuously—working under a trolley pres-

sure of 11,000 volts. Two similar locomotives were added in 1917. These handle 1,750 tons behind the steam locomotive.

#### ELECTRICAL OPERATION ON THE B., A. & P.

The Butte, Anaconda & Pacific Railway was electrified during 1912 and 1913. In the symposium it was covered by F. W. Bellinger, electrical superintendent, his contribution being the same paper as that read at the Pasadena convention of the N. E. L. A. on May 21. As this paper was fully abstracted in the issue of the ELECTRIC RAILWAY JOURNAL for May 29, page 1101, it will not be necessary to repeat the abstract here. Mr. Bellinger concluded his paper with the significant statement: "For our service the electric locomotive is in every respect far superior to the steam engine."

#### EQUIPMENT FOR HEAVY TRACTION ON THE NORFOLK & WESTERN

John A. Pilcher, mechanical engineer Norfolk & Western Railway, described the equipment on the portion of the Pocahontas division familiarly known as the Elkhorn grade. The conditions here, he said, were favorable for electric traction because there was an entire short operating division on which electric power could be substituted for steam between engine terminals without shortening or interfering with adjoining operating divisions. In addition there were heavy grades where power requirements were great, and the large volume of traffic taxed the capacity of the line because of physical limitations and slow operating speeds. In this case the primary objects of electrification were the increased capacity of the line, and economy and increased efficiency of the service generally. The present electrification extends from Vivian to Bluefield. For information beyond that contained in his paper Mr. Pilcher referred to the issue of the ELECTRIC RAILWAY JOURNAL for June 5, 1915, and to papers before the New York Railway Club on March 19, 1915, by George Gibbs and on March 16, 1917, by C. H. Quinn.

Comparing electrical operation with steam, Mr. Pilcher said that it was customary under the latter to make up a train to a maximum weight of 3,250 tons behind the engine and to handle it by a Mallet road engine and a Mallet helper over the division, with a Mallet pusher in addition at the 1½ per cent and 2 per cent grades, or three engines per train. In cold weather and under adverse conditions the trains were reduced to about 2,900 tons. The engines were of the latest compound type, fitted with mechanical stokers and superheaters, weighing about 370,000 lb. on drivers and 540,000 lb. total, including tender, with a tractive power of about 85,000 lb. Tonnage trains were handled normally at speeds of 7 or 8 m.p.h. on the grades, but on account of the ventilating conditions the speed was reduced to 6 m.p.h. in the Elkhorn tunnel.

The decision to electrify, arrived at about seven years ago, followed a careful study by the officials of the road of the actual steam operating costs on this particular division. Twelve electric locomotives were provided for the service, replacing thirty-four Mallets. Alternating current at 11,000 volts with an overhead contact wire was selected for the installation, with the locomotive equipped with three-phase motors, a phase converter being used on the locomotive to change the single-phase current into three-phase current. The drawbar pull of the locomotive varies from a maximum of 114,000 lb. during acceleration to the 14-mile speed to 86,000 lb.

and operating at this speed uniformly on a 1 per cent grade. The valuable characteristic of this type of electric locomotive is its capacity of safely exerting full tractive effort for a considerable time while standing.

Mr. Pilcher said that electric operation has been in service too short a time to give data as to performance, but the estimates of increased capacity have been fully met. The acceleration of one of these heavy trains is impressive as regards the amount of power required. Preliminary tests indicate that getting a train in motion up the grades requires as much as 11,000 hp. (electrical), and that running at uniform speed up the grade requires 8,000 hp.

There are twenty coal trains hauled eastward daily and six time-freight and passenger trains are helped up the grade. The daily coal-train tonnage eastward is 65,000.

#### DATA REGARDING THE C., M. & ST. P. RY. ELECTRIFICATION

The general superintendent of motive power of the Chicago, Milwaukee & St. Paul Railway, H. R. Warnock, contributed to the report a synopsis of the results of electrification of sections of that road. The railway was first interested in electrification at the time of its extension from the Missouri River to the Pacific Coast. The reason for its consideration was to lessen the fire hazard, as the line was building through a very extensive forest reserve of the government. The consulting engineers first decided upon a single-phase trolley system, but the plan was abandoned owing to insufficiency of power available on the St. Joe River. In the meantime the road secured a site for power development on Clark's Fork of the Columbia River.

The railway, in its operation, to secure terminal facilities at Butte and traffic for its new road, established relations with the Amalgamated Copper interests in Montana and acquired a substantial interest in the Butte, Anaconda & Pacific Railway, which was owned by the Amalgamated company. About this time the Great Falls Power Company, which was also controlled by the copper interests, was seeking a market for power from its important development and to that end acquired the Madison River Power Company and the Butte Electric Company, which were controlled by C. A. Coffin, president of the General Electric Company and affiliated interests, the combination being called the Montana Power Company.

For the purpose of developing a market for power as well as to develop electrified operation and to secure the savings therefrom the B., A. & P. was electrified, the contract being made with the General Electric Company. The engineering work was done by the Montana Power Company and the General Electric Company. The result of this undertaking was successful financially as well as technically.

About this time a representative of the General Electric Company made a report on the electrification of the Rocky Mountain division of the C., M. & St. P., based upon duplication of the locomotives and substation apparatus in use on the B., A. & P. No consideration of regeneration or control of peaks was contemplated. Based upon this report the contract was made with the Montana Power Company for a nominal sum of 10,000 kw. for the Rocky Mountain division, with options provided under certain times for an increase to a maximum of 25,000 kw. The contract further

provided that apparatus would be secured by the railroad capable of regulation of power factor, and that the minimum monthly charge would be equivalent to an average of 60 per cent of the nominated maximum power.

The road entered into a similar contract for the extension of the electrification to include the Missoula division from Deer Lodge, Mont., to Avery, Idaho. It was concluded that the topography of the road was particularly suited to regeneration and that this would be required. Another conclusion was that automatic means should be provided for the limitation of the maximum demand for power.

The Westinghouse Electric & Manufacturing Company submitted an analysis, including an estimate on the cost of electrification, based on a single-phase trolley, split-phase locomotives for freight service, series commutator motors for passenger service and substation apparatus to convert from 60 cycles and to reduce automatically both voltage and frequency when the demand exceeded the predetermined peak setting. Each locomotive and each dispatcher's office was to be equipped with frequency meters so that at all times those interested in the condition of power demand would be able to function advisedly.

Analysis of the probable load condition with 2,500-ton trains led to the conclusion that a voltage higher than 2,400 was economical, and supporting this was a demonstration by the Westinghouse Company of a high-voltage car equipment, which was operated at 6,000 volts, direct current. The voltage of 3,000 was therefore decided upon and contracts were made with the General Electric Company for the electrification of 440 miles from Harlowtown, Mont., to Avery, Idaho. The execution of this electrification has been unique in the perfection of its details. The technical result of the electrification has been quite a success, and the financial result, due particularly to fuel and labor conditions, and the indirect value due to the publicity of this operation have been equally satisfactory.

Mr. Warnock also described the additional electrification of the Columbia and Coast divisions, which has been covered in detail in recent issues of the *ELECTRICAL RAILWAY JOURNAL*.

In regard to operating organization, Mr. Warnock said that the two divisions, Rocky Mountain and Missoula, are under one superintendent, who had two assistants, one for each. Train dispatching is done from Deer Lodge by telephone, one set of three dispatchers handling the Rocky Mountain division and another the Missoula division. Under steam operation there were two division superintendents, one at Three Forks and the other at Missoula. Each of these points had two sets of dispatchers operating in either direction, which made a total of four dispatching districts.

Electric locomotives run from Deer Lodge through to Harlowton and Avery, respectively. Under steam operation locomotives were changed at the intermediate engine points, Three Forks and Alberton. The radius of the locomotive has, therefore, been doubled. The locomotive repair shop is at Deer Lodge, two men being located at Avery and Harlowton respectively, to attend to light inspection. The master mechanic at Deer Lodge has general charge of substations, a supervisor being in direct charge of the latter. Three operators, each working on an eight-hour shift, are provided at each substation. Maintenance of the trolley and transmission lines is under the charge of a general foreman of

maintenance, reporting to the superintendent of the two divisions. In general, three maintenance crews are used, each consisting of a foreman, two linemen and a helper, provided with suitable work train.

#### A WORD FROM A C., M. & ST. P. MASTER MECHANIC

The division master mechanic of the C., M. & St. P. Ry., E. Sears, reported that comparing his experience with maintenance of equipment under 3,000-volt and 600-volt operation, the former is affected more by weather conditions; that is, all resistance units have to be kept freer from moisture. Also experience has shown that it is poor policy to try to break heavy currents at 3,000 volts, except through resistance, for the vapor and fumes formed by the copper will cause the current to jump as far as 6 ft. A number of contactors were burnt out, due to the facts that there were no circuit breakers on the locomotives and that the main motor currents were broken through twin contactors. This trouble has been eliminated by the insertion of a small amount of resistance ahead of the contactors when arcs are broken. The new locomotives are equipped with high-speed circuit breakers.

Mr. Sears has not found any special difficulty in keeping insulators clean to prevent creepage at 3,000 volts. There has been no trouble with the "freezing" of the contactors, which require very little attention. Under normal operation there is about 600 volts drop between substations, with a greater variation brought about by the power-limiting apparatus. The method of collecting current from the overhead is ideal, being sparkless, with little wear on the double No. 0000 contact wire.

Mr. Sears said that the pantographs are greased with graphite grease at terminals and require no further attention on the road. The average life of pantograph strips is from 9,000 to 10,000 miles. Pantographs can be more cheaply maintained than third rail shoes, but are susceptible to being torn off on account of lack of alignment of the overhead. This is probably due to the method of overhead maintenance, as it appears that the overhead maintenance crew depends upon the pantographs to show where the bad places in the overhead are. In hot weather, when the expansion is greatest, as many as fifteen pantographs have been lost in one month.

#### ELECTRICAL EXPERIENCE ON THE LONG ISLAND

G. C. Bishop, superintendent of motive power Long Island Railroad, gave an account of electric operation on its lines. As this subject was covered in last week's issue of this paper, it will not be necessary to go into details here. He said that the Long Island still furnishes the most extensive example of multiple-unit passenger train operation. Steam-operated express trains to the eastern end of the island are taken from the Pennsylvania station by electric locomotives to Long Island City, at which point steam locomotives are attached. It is probable that in the near future electric locomotives will haul these through trains to Jamaica. The freight service is still conducted by steam and on some portions of the electrified system steam locomotives are used to operate both freight and through passenger trains.

#### SOUTHERN PACIFIC ELECTRIFICATION EXPERIENCES

The electrification of the Southern Pacific Company's Oakland, Alameda & Berkeley suburban lines was discussed by George R. McCormick, general superintendent

of motive power. This improvement, he said, was part of the general rehabilitation of the Southern Pacific property carried on by Mr. Harriman. In the fall of 1906 instructions were given to begin electrification. At present more than 900 electric trains are operated daily from the two ferry landings and 32,000,000 passengers are handled annually. He referred to a complete description of the distribution and trolley system given in the *ELECTRIC RAILWAY JOURNAL* for Oct. 21, 1911.

The trains on the O., A. & B. run from one to seven cars, operated on the multiple-unit system, a train unit consisting of one motor and one trail car. On the motor car are four 140-hp. motors. The two motors on each truck are connected permanently in series, so that although the equipment is a four-motor one, the control is of the two-motor type. The car repair shop, located at West Alameda, was designed for inspection and quick overhaul of the entire equipment. Detailed description of these cars and this shop will be found in the *ELECTRIC RAILWAY JOURNAL* for June 17, 1911.

The total single-track mileage electrified on this system is about one hundred and the car equipment comprises sixty trail coaches, fifty straight motor coaches, twenty-nine baggage and passenger motor coaches, two express and baggage motor cars and ten street cars. The system was placed in electrical operation in 1911.

The report abstracted above was presented, in the absence of the chairman, Mr. Quereau, by J. A. Pilcher, who said he would not attempt to read the paper, but in presenting it for consideration he wished to call attention to the great number of different schemes that had been studied in connection with the problem of electrification. This method of operating our roads, he said, now seems destined to become a great factor in the development of the future and is particularly adaptable to all service conditions requiring a heavy power output. Mr. Pilcher referred to the constant speed feature of some electric locomotives as being particularly desirable in order to maintain dependable service.

There was no discussion of the paper.

The chairman of the association, W. J. Tollerton, said he considered the subject of electrification a very important one, especially when viewed from the standpoint of conservation of fuel.

The paper was received and a vote of thanks was extended to the committee for the exhaustive paper that had been prepared.

### Mr. Hurley on Trade Papers

**E**DWARD N. HURLEY, formerly chairman of the Federal Trade Commission and during the war chairman of the United States Shipping Board, has a good opinion of trade papers. In the course of an address on June 8 to the Associated Advertising Clubs of the World at Indianapolis he said:

When I was chairman of the Federal Trade Commission I made it a point to have the principal trade papers in the United States sent to me regularly. These were read not only by myself but by the entire staff, so that we might have a finger on the pulse of the country's industry. Advertising agencies placing national and international advertising could well insist on every man in their employ reading the trade journals of the industries of their clients so that they may keep themselves currently informed on the conditions in the businesses for which they are writing copy. I believe in the business journals. I have been closely associated with the work of many and have made a study of them, and I am firmly convinced of the editorial strength and value of many of these publications.

## The Locomotive as an Investment

Author of A. R. A. Paper on This Subject Points Out Some Improvements Made in Steam Locomotives in Recent Years

**I**N AN individual paper contributed to the program of the A. R. A. Atlantic City meeting by G. M. Basford, president Locomotive Feed Water Heater Company, some information is given as to the steam locomotive in its rôle of rival of the electric locomotive. Mr. Basford said that the locomotive is a big investment and it must be so considered and so treated. In no other branch of engineering development have so much progress and improvement been made in efficiency as has been made in the steam locomotive during the present official generation, and the improvement has just begun. If all new and all existing locomotives are made as efficient as the best, and it is possible to make them nearly so, private ownership and operation of railroads will be put in the way of success, but no matter how efficient the power unit may be as a unit, its operation must be such as to obtain the benefit of the possible efficiency for the maximum number of ton-miles per hour. Among other things this calls for the best locomotives and the best use of locomotives, quick and continuous movement, reduction of idle hours, quick terminal movements, improved dispatching, improved maintenance and repair facilities and repair methods, as well as fuel and labor-saving improvements of every kind. Whatever, said Mr. Basford, we may have in the future, today the steam locomotive is the most vital influence in the progress of civilization. Its possibilities for assisting in meeting the problems of the present and future by reducing the cost of transportation are beyond the imagination of all who have not made a careful study of the improvements now available for increasing capacity. Whenever you wish, he said, you may put on the rails locomotives that, from a performance and particularly from an efficiency standpoint, will hold their own with the best non-condensing power plants on land or afloat. You may at any time produce a drawbar horsepower-hour for 2.25 lb. of coal at the speed giving the maximum power of the engine. The problem is how to make all the locomotives of this country approach the standard already set, how to make the best use of facilities that are already available, also how to keep abreast of future improvements.

Mr. Basford challenges some of the contentions made by proponents of the electric locomotive in these words: "Electric locomotive partisans are propagandists in arguments for electricity vs. steam. They argue, however, on the basis of the steam locomotive as they knew it in the past rather than as it is today. They further weaken their case by absurd claims to the effect that electric locomotives can save two-thirds of the coal burned by all the steam locomotives in the country, and they base their claims on the steam locomotive of ten years ago. The truth is that in five years of this period the economy and capacity of the steam locomotive have more than doubled. The object is not merely to win out against the electric but to pit the steam locomotive against the high cost of everything. Constructive, systematic policy of locomotive engineering and operation is the way to do this and it will do it."

"We are told that electricians are replacing steam locomotives. We do not hear enough about the thirty-eight steam Mikados that replaced twelve Moguls and thirty-eight Consolidations on the Missouri, Kansas & Texas

several years ago and of the 41.8 per cent increase in train-loads, also of the reduction of 23 per cent in the number of trains. The Norfolk & Western replaced fifty-seven engines with forty, with the reduction of 26 per cent in the number of trains for the same traffic. The Delaware & Hudson showed a saving of 43.8 per cent coal by substituting Mallets for Consolidations. Each Mallet replaced two Consolidations. A year later each of these Mallets showed 7.6 per cent better fuel records and each of them continued to do the work of two Consolidations, while burning less coal than one of the Consolidations. On the Chesapeake & Ohio twenty-five Mallets replaced forty-four Consolidations, saving 37 per cent in the cost of handling freight traffic. This has been going on the country over in cases too numerous to mention, but too little is said about these improvements and too little is said about future possibilities. When every existing locomotive is thoroughly modernized, when all are operated with the study, care and supervision called for and when coal and fuel oil are used as if they were expensive, then this association and the men who make it will be recognized for saving the railroads. In this scheme of things the obsolete engine, lacking power-saving, capacity-increasing, fuel-conserving and safety factors, has no place."

## 100,000 Square Feet of Exhibits

**At Atlantic City Convention of A. R. A., Mechanical Section, the Exhibits, in Extent and Variety, Exceed Previous Records**

**I**N CONNECTION with the annual convention of the American Railroad Association, mechanical section, at Atlantic City this year the exhibits of railway supplies is, as usual, an important feature. Every square inch of space on Young's "Million Dollar Pier" was utilized this year, including the balcony in the main entrance hall. Even then a large number of prospective exhibitors were turned away; others had to be satisfied with smaller space than they wished or else to share space with fellow manufacturers. When the convention opened on Wednesday, June 9, there were 359 exhibits, using a floor space of over 100,000 sq.ft. Last year, which surpassed any previous one, there were 314 exhibitors, occupying an exhibit space of 93,499 sq.ft.

Due to railroad strikes and freight congestion, many of the exhibits had great difficulty in getting their material to Atlantic City. A large number of Philadelphia concerns and even those at greater distances used motor trucks to bring in their equipment.

Machinery Hall was filled to capacity with all types of shop tools. Automatic machines attracted considerable attention, and in studying the various exhibits one gained a definite impression that manufacturers are endeavoring to solve the labor problem by producing machines that will cut down the operators' duties to a minimum. Another point that one cannot fail to note was that numerous devices that were considered innovations only last year are now being manufactured as standard equipment.

Discussions of the possibilities of increasing shop capacity and efficiency that have come up during the past year have directed the manufacturers' attention to the possibilities and they are proceeding to carry them out. The men responsible for the care and maintenance of railway equipment realize now as never

before the particular value that comes from having up-to-date tools to carry on their work. The wages now being paid to labor make inefficient machinery not only unsatisfactory but very expensive. In comparing the machine tools exhibited with those ordinarily found in electric railway shops one is forcibly impressed with the value of the late type of equipment and the need for our repair shops to keep abreast of the times in order to increase production and efficiency.

Many automatic turning and grinding machines as developed for railway work were in operation at the convention. Some of these automatic machines were really a combination of several machines, each one performing a definite operation and using a certain tool arrangement. The use of such machines has been extended to many operations previously done on other types. Thus rings and parts that require accurate finishing for air brake use, which were formerly made of brass and ground by hand, are now finished in a grinding machine equipped with a magnetic chuck. Various other parts and operations show the possibility of large savings by the introduction of automatic machines in railway shops.

The saving of labor in connection with machine-shop equipment was ably supplemented by many exhibits of equipment for handling and transporting material in the shops. The several displays of hoists, cranes, jacks and truck tractors demonstrated how great savings were possible by use of these devices for handling equipment and material.

Details of the important features of the exhibits will be given in a later issue.

## Merchandising Transportation Discussed by Missouri Utilities

**Public Utilities Association Holds Fourteenth Annual Convention—Subjects of Particular Interest to the Industry Were Discussed—New Officers**

**T**HE Missouri Association of Public Utilities temporarily displaced the legislators of the State when it held its fourteenth annual convention in the State Capitol at Jefferson City last week. The business sessions were devoted to the consideration of the possibilities of merchandising transportation, financing utilities, public relations and regulation and the development of water power in the state. Interspersed were other equally busy sessions devoted to the enjoyment of golf, a barbecue, dancing, a banquet and baseball. The business sessions were held in the State House of Representatives, where the association members and guests were welcomed by Lieut.-Gov. Wallace Crossley, who said that the State was due for a great industrial development and that the public utilities should be equipped to supply the additional service that will be required of them. L. P. Andrews, acting president of the association, responded to Governor Crossley's address on behalf of the association.

F. G. Buffe, general manager of the Kansas City (Mo.) Railways, delivered an address on "Merchandising Transportation," which will be published in a later issue of this paper.

"Public utilities should render the best possible service under the conditions, not only because it is the duty of the companies to do so but because it is very difficult for a commission to give relief from inade-

quate rates when the service is not what it should be." This was the statement of William G. Busby, chairman of the Public Service Commission of Missouri, in an address he delivered on the advantages of state as compared to municipal regulation. "Municipal plants may be constructed in Missouri without permission of the commission, but when in operation the rates charged and the service rendered come under the jurisdiction of the commission."

"Utilities have been yellow," said M. H. Aylesworth, executive manager of the National Electric Light Association, in his address on "Public Relations." "Agitators have been allowed to denounce utility companies with impunity, and the public utility men have not given the public the correct information about their companies. The utility men should get out and fight those who malign them, because dishonest attacks will be prevalent until they are exposed by an honest defense."

The weakness of most utility financing is the fact that the company's securities have been mainly sold outside of the community served, according to C. E. Randall of the Bank of Commerce, Springfield, Mo., who said, in the course of his address on the financing of public utilities: "Practically every community can finance extensions and betterments of the utilities whose service the people require. Better conditions for public utilities will come with a more thorough public knowledge of the needs of the company, and nothing in the future can be as bad as what the utilities have gone through and conquered."

The officers and committees elected to serve for the year 1920-1921 were as follows: President, L. P. Andrews, Sedalia, Mo.; first vice-president, Herman Spoehrer, St. Louis.; second vice-president, Col. P. J. Kealy, Kansas City, Mo.; third vice-president, E. R. Locke, Mexico, Mo.; secretary-treasurer, Frank D. Beardslee, St. Louis, Mo.; executive committee, E. D. Smith and Hugo Wurdack, both of St. Louis; E. R. Locke, Mexico, Mo.; T. C. McKenzie, Hannibal, Mo., and J. S. Tritle, St. Louis. The last three were hold over members of the executive committee from last year. Members elected to the public affairs committee were E. D. Bell, St. Louis, chairman; L. B. Landmann, Jefferson City, Mo.; B. C. Adams, St. Joseph, Mo.; J. Dana, Kansas City, and J. D. Van Mauer, St. Louis. Members of the public affairs committee who held over from the previous administration were Hugo Wurdack, St. Louis; E. H. Algermissen, Montgomery City, Mo., and W. H. Henby, University City.

### Regional Power Development

BY WAY of discussion of the plan outlined by W. S. Murray for a "super-power" development along the Atlantic seaboard, C. M. Garland, consulting engineer, Chicago, Ill., contributes an article to the *A. I. E. E. Journal* for May, in which he advocates study, in this connection, of the Mond byproduct system of gas generation with low temperature distillation of coal. He claims that in the United States the value of \$2,500,000,000 is consumed annually with coal in the form of tar and ammonium sulphate, of which 25 per cent could be recovered. In the Mond process the coal is converted into gas, tar and ammonia, the last named having a value of from \$2 to \$4 per ton of coal gasified. The tar consists principally of pitch, which has little or no value. The gas has a calorific value of about 140

B.t.u. per cubic foot and from 65 to 70 cu.ft. are produced per pound of coal. Mr. Garland's point is that any super-power plan must include provision for industrial heating, which he thinks the Mond system would do.

### One-Man Cars in Australia

THE Electric Supply Company of Victoria, Ltd., was the first to place one-man cars in operation in Australia, introducing them on its property at Ballarat and Bendigo, Victoria, about six and one-half years ago. Some information concerning these cars appeared in the *ELECTRIC RAILWAY JOURNAL* for Jan. 22, 1916, page 172, in a communication from P. J. Pringle, chief engineer and general manager of the company.

Mr. Pringle has recently compiled comparative figures on accidents to passengers alighting from or boarding both one-man cars and cars under the control of a conductor. The result for Ballarat appears in the accompanying table. In connection with this it should be explained that the one-man cars were introduced in May, 1913, and during the following year were installed on five routes. From May to July, 1915, they were in-

COMPARISON OF ALL ACCIDENTS REPORTED DUE TO PASSENGERS ALIGHTING OR BOARDING TRAM-CARS, BALLARAT, AUSTRALIA

Year	Control	Alighting	Boarding
1911.....	Conductor.....	47 .....	3
1912.....	Conductor.....	40 .....	5
1913.....	One-Man.....	0 .....	0
1913.....	Conductor.....	62 .....	3
1914.....	One-Man.....	6 .....	1
1914.....	Conductor.....	39 .....	3
1915.....	One-Man.....	7 .....	3
1915.....	Conductor.....	24 .....	2
1916.....	One-Man.....	12 .....	1
1916.....	Conductor.....	13 .....	3
1917.....	One-Man.....	7 .....	0
1917.....	Conductor.....	12 .....	2
1918.....	One-Man.....	3 .....	0
1918.....	Conductor.....	10 .....	1
1919.....	One-Man.....	3 .....	1
1919.....	Conductor.....	7 .....	1
Total.....	One-Man.....	38 .....	6
1913-1919....	Conductor.....	167 .....	15

stalled on two additional routes. Thus the year 1916 shows the full effect of the installation of one-man cars. This year should be compared with 1911 and 1912, when there were no one-man cars in operation. The year 1913, when the one-man cars were first introduced, also offers an interesting comparison, as no accidents in connection with their introduction are reported.

When all the one-man cars were in operation the annual mileage of these cars was approximately 400,000, out of a total of 500,000, or 80 per cent. As the numbers of passengers per car-mile on the two types of car do not vary materially, the number of accidents due to the greater mileage even if the one-man cars had been in charge of a conductor might have been expected to be four times as great as on those cars which operate only 20 per cent of the mileage. As a matter of fact, in the last four years there were forty-two alighting accidents and seven boarding accidents on cars in charge of conductors, while there were only twenty-five alighting and two boarding accidents on the one-man cars.

Another convincing result of the efficiency of one-man operation in Australia is the fact that since the introduction of the one-man cars the premiums insuring the company against third party claims have been reduced four times, the reduction in total amounting to 40 per cent. This fact is particularly important in view of the increasing importance which is being given to the safety-first campaign both in Europe and in this country.

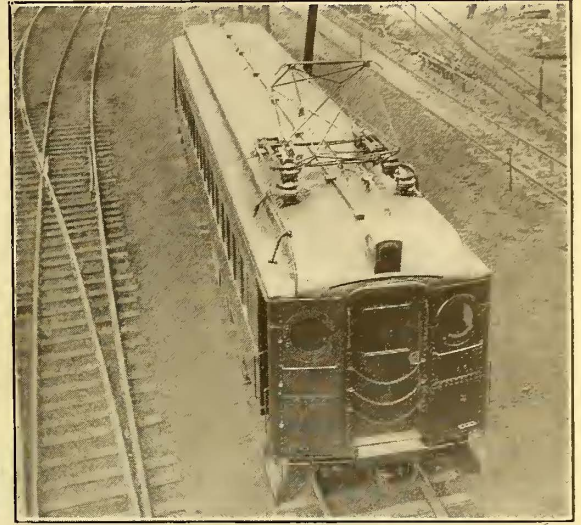
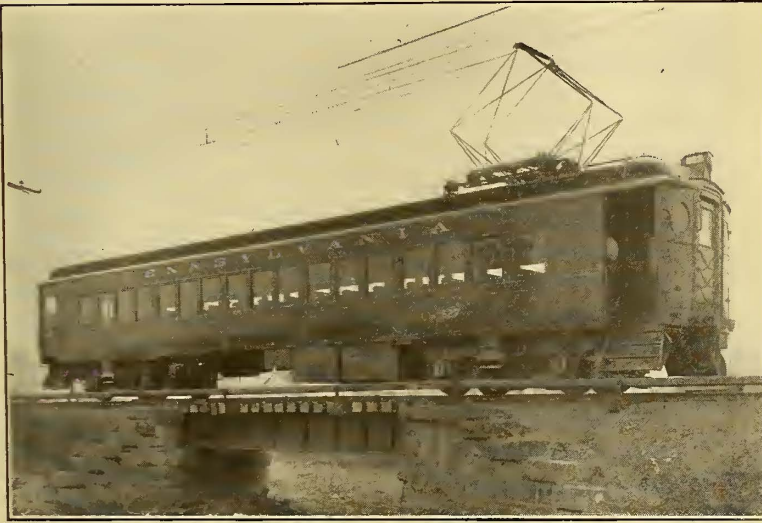


# New Equipment for the Philadelphia Electrification

Motor Is of Commutating-Pole Type and Control Provides for Protection Without Circuit Breakers on Cars—  
Ingenious Screens Used to Exclude Dust from Motors

By WALTER H. SMITH

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.



AT LEFT, PENNSYLVANIA RAILROAD MULTIPLE-UNIT CAR. AT RIGHT, CONSTRUCTION AND MOUNTING OF PANTOGRAPH. NOTE CONSTRUCTION OF INSULATING BASE

THE electrified portion of the Pennsylvania Railroad terminating at Broad Street Station, Philadelphia, covers a distance of 20 miles to Paoli and one of 12 miles to Chestnut Hill. There are now 115 motor cars in service in this electrified zone, including nine combination passenger-baggage and two baggage-mail cars. Since the original equipments were placed in service the Westinghouse company has developed a new single-phase railway motor, as well as certain refinements in control and auxiliary apparatus. The railroad, in accordance with its policy in providing for future requirements, has equipped a car with these motors.

The old equipments now in service employ two 225-hp. Westinghouse, single-phase, doubly fed commutating motors, both of which are mounted on one truck. The new equipment will employ two 250-hp. single-phase commutating motors of the commutating-pole type, similarly mounted. The new motors will be interchangeable with the old ones, so far as mounting on the trucks is concerned, except for the pinions, the gear ratio for the old equipments being 24:55, while that for the new equipment will be 21:55. The gears are of the flexible type and consist essentially of three parts, (a) center, (b) rim and (c) the flexible members or springs. The rims are made from high-grade treated steel forgings accurately machined with  $5\frac{1}{4}$ -in. face. These flexible gears may be compared to shock absorbers and will very largely relieve the armature bearing and motor windings from vibration due to irregularities in the track or other causes.

The frame of the motor is of the box type, made of

steel cast in a single piece. At the ends are large openings machined to receive the bearing housings and to permit removal of the armature.

#### RESISTANCE LEADS ARE NOT USED

The armature is lap-wound, with coils cross-connected, but has no resistance leads between the commutator bars and the coils. The armatures, main fields, auxiliary and commutating-pole windings are permanently connected in series, as shown in the accompanying circuit diagram.

The new equipment is designed for multiple operation with those now in service. The Westinghouse type "AB" (automatic acceleration, battery operated) multiple-control system is employed and permits a train of from two to ten cars to be operated from the master controller on any car; that is, each car of the train is propelled by its own motors and is controlled as a single unit.

It is to be understood that any two equipments with different motors, gear ratios and different weights of car will operate in multiple if designed for the same rate of acceleration and placed under the control of a current limit relay, provided that (a) the tractive efforts per ton for each car at start are approximately equal, (b) the free running speeds of both cars are equal when the motor curve is reached, (c) the balancing speeds of both cars are equal.

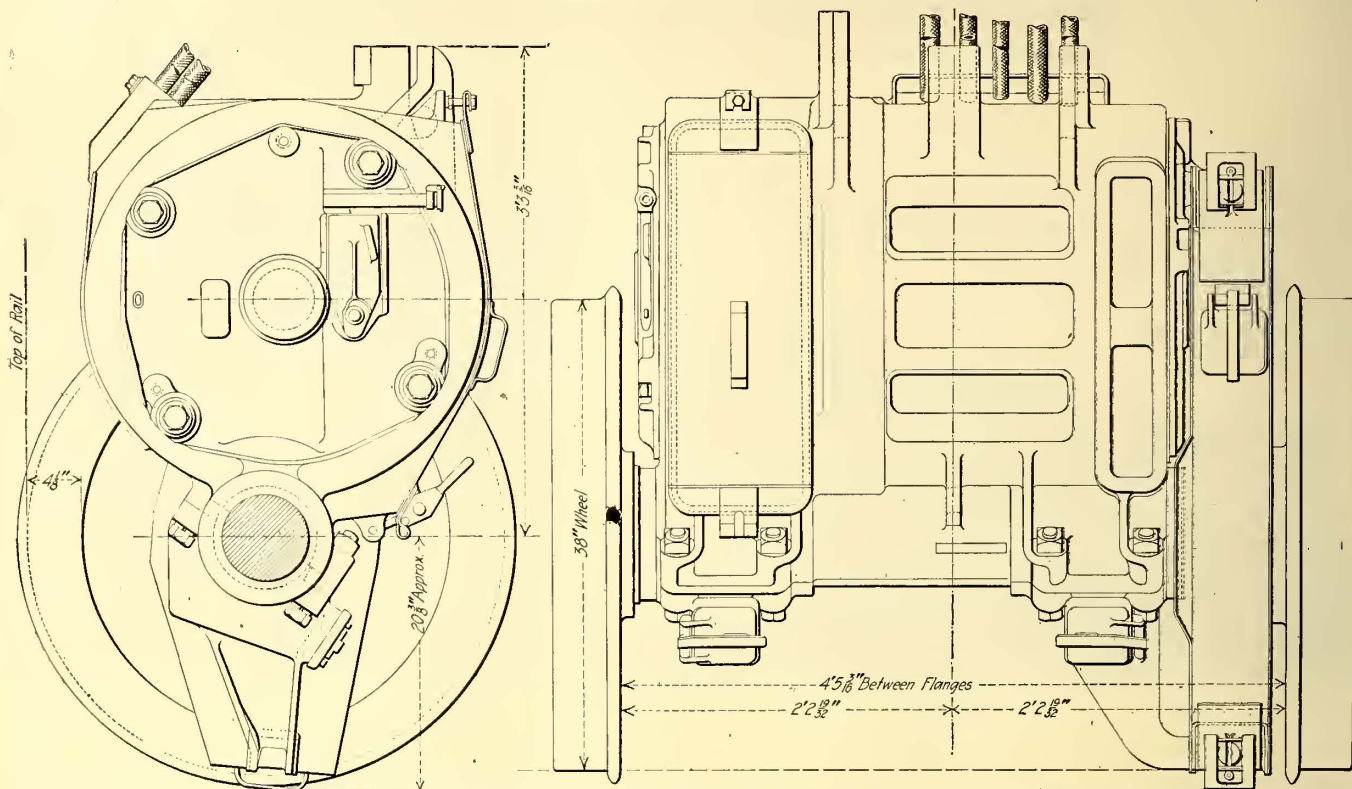
The energy for operating the magnet valves of the control apparatus and other devices is secured from a motor-generator set and storage battery at approximately 200 volts. The storage battery consists of 25

cells of the Edison B-2-H type in series and connected so as to float on the system when the motor-generator set is running. The control circuit is tapped from the first and sixteenth cells. The lighting system for the car is also supplied from one or the other of these units and will be described later.

The car is provided with one sliding shoe pantograph trolley, having automatic, self-adjusting action to con-

in order that the magnet coil will be de-energized when the operator's hand is removed. The "trolley unlock" magnet-valve circuit is so interlocked with the main motor circuit that the pantograph cannot be raised when the master controller is in any running position.

The trolley is lowered by the "trolley down" button. This button completes the circuit to the "trolley down" magnet valve, which controls the admission of com-



OUTLINE OF THE SINGLE-PHASE COMMUTATING-POLE MOTOR, SHOWING OVER-ALL DIMENSIONS AND CLEARANCES

form to any trolley wire height from that of 15 ft. 6 in., the lowest under bridges, to a normal height of 22 ft. along the open line. The pantograph is mounted on the roof of the car above the motor truck. It is raised and held in position by spring pressure and lowered by compressed air from the control reservoir. The insulating base of the pantograph consists of four porcelain insulators. In addition to this, there is a secondary insulating base consisting of four porcelain insulators similar to those which form a part of the trolley and arranged to carry angles which act as supports for the pantograph as a whole. This construction also provides double insulation. The pantograph is provided with a grounding switch to insure safety to any one working on the apparatus of the car. The construction and mounting of the pantograph are shown in one of the reproduced photographs.

HOW THE PANTOGRAPH IS CONTROLLED

The operation of the pantograph is controlled by two push buttons which are incorporated in the master controller. These push buttons actuate two magnet valves which control the admission of compressed air into the operating cylinders. The pantograph is released by the "trolley unlock" button. This button completes the circuit to the "trolley unlock" magnet valve, which admits compressed air to the operating cylinder of the locking device, causing it to disengage and allow the springs to raise the pantograph and hold it in the running position. This button is provided with an automatic release

pressed air to the operating cylinders. These force the pantograph down, where it is locked and held in position by the locking device. This button is not provided with an automatic release and must be pulled down manually to release the air from the main operating cylinders before the pantograph can be raised again.

A small hand pump is supplied in order to provide a means to disengage the locking device and raise the pantograph when there is no compressed air in the control reservoir. A few strokes with this pump will compress enough air to charge the locking-device release cylinder.

There is no line switch or oil circuit breaker provided to disconnect the transformer from the trolley in case of motor trouble, overload, ground or short circuit. The following methods are employed as a means of protection to both the high and low tension circuits.

A series transformer is inserted in the high-tension lead from the pantograph to the primary winding of the main transformer. The secondary winding of this device is connected to the operating coil of the pantograph-lowering relay. This transformer has a ratio of 20 to 1, and when excess current flows through its primary winding, as in the case of a ground or short circuit in the main transformer, the relay will function and lock in position so that the "trolley down" magnet coil will be energized and the pantograph on the affected car will be automatically lowered after the power has been removed from the trolley wire, either by the operation of the sectionalizing or power house breakers.

The functioning of this relay prevents the release of air from the operating cylinders and the pantograph cannot be raised again until the relay has been manually reset.

The motors and low-tension circuits are protected by two relays which function on an overload. One of these relays is inserted in the motor circuit between the preventive coil and the compensating relay and the other is in the auxiliary circuit between the switch group and the commutating-pole windings. The parts of these devices that govern the control circuit are connected in series and it is only necessary for one of them to function in order to open all of the switches of the group that have been closed and to cut off power.

When excessive current flows through the relay operating coil in the main motor circuit, or the auxiliary circuit to the commutating-pole windings, the armature of the relay affected is raised and locked in position by a latch, thus rupturing the control circuit and opening all switches. The relay is "reset" to its normal position by removing the control cutout plug from the "cutout" receptacle in the master controller and inserting it in the "reset" receptacle. The control plug must again be inserted in the "cutout" receptacle before operation of the car or train can be resumed.

The main transformer is of the shell type. The laminations are built up closely around the assembled coils with interleaved joints and are clamped tightly together between end frames. There are three separate

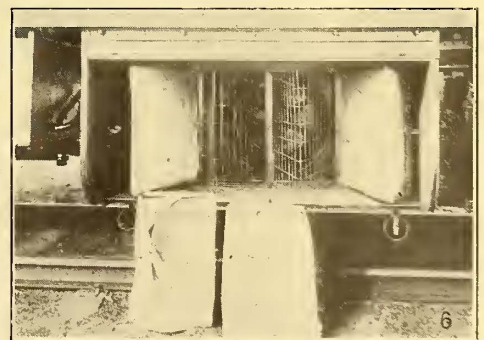
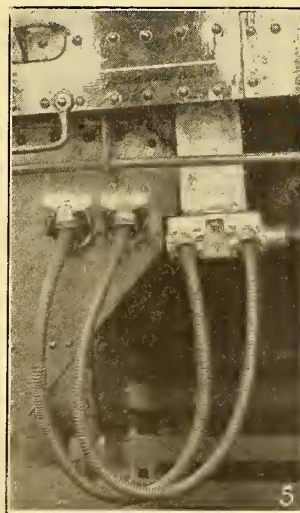
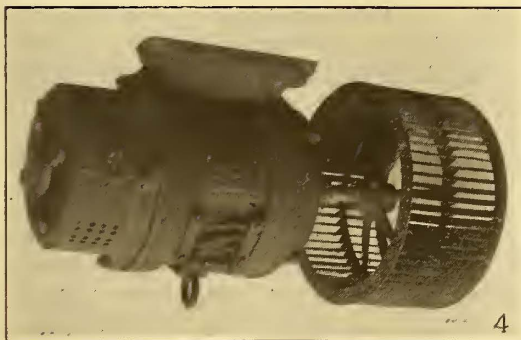
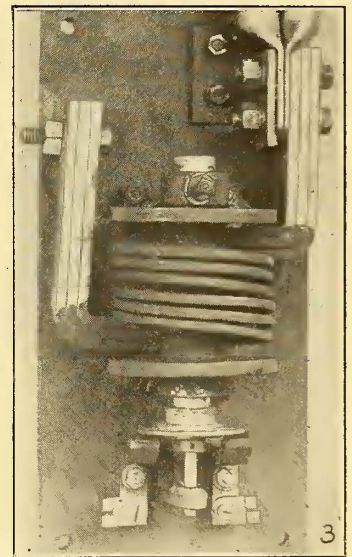
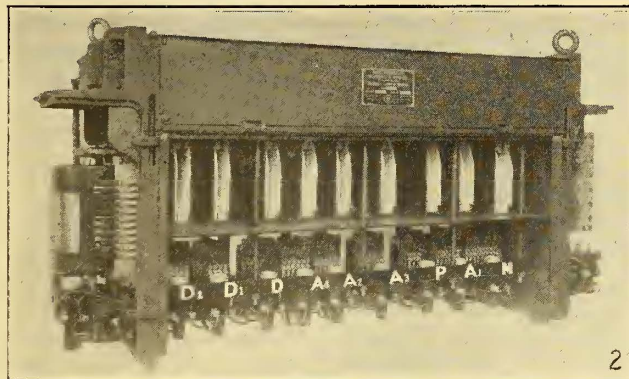
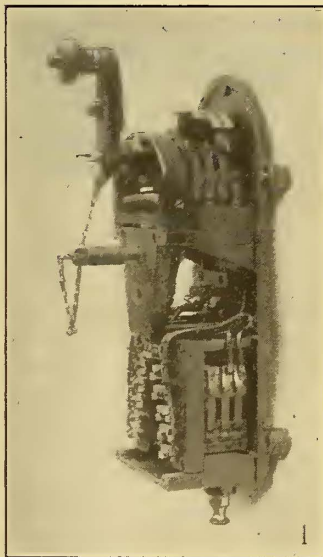
and distinct windings, each consisting of a series of coils clamped together and arranged with ventilating ducts so as to secure practically a uniform temperature throughout the entire winding. The transformer is cooled by the flow of air from the ventilating system, which will be described later. The ventilating air enters the low-tension end and is discharged at the high-tension end.

Alternating current at 11,000 volts, 25 cycles, is collected from the trolley wire through the pantograph and series transformer to the primary winding, thence to the rails which form the return circuit.

The main circuit arrangement requires only one preventive coil. This coil is supplied in order to secure smooth acceleration and to prevent the breaking of the main circuit during transition from one transformer tap to another during acceleration. It is also of the shell type and has a single winding. This device makes it possible to secure seven accelerating points with five switches, as shown in the diagram. The preventive coil is suspended from the underframing of the car body near the switch group and transformer so as to secure the shortest possible run of cable. It is also cooled by the flow of air from the ventilation system.

SOME DETAILS OF THE CONTROL APPARATUS

The control system employs nine electro-pneumatically operated switches. These switches are assembled in a group and enclosed in a steel box which is located under



VIEWS OF PARTS OF THE EQUIPMENT OF THE PENNSYLVANIA MULTIPLE-UNIT CAR

No. 1—Master controller, cover removed. Note control plug, cutout, and reset receptacles; also automatic spring release. Plug in upper no. 10 etc. in lower for cutout.  
 No. 2—Front view of switch group and sequence switch end, covers removed. Note sequence switch drum and reverser magnet valve at opposite end.  
 No. 3—Accelerating limit relay.

No. 4—Blower motor and runner.  
 No. 5—Arrangement of train-line jumpers. Note method of carrying jumpers in dummy receptacles when not in use and also armor for jumper cable. Right-hand jumper for brakes, left-hand for control.  
 No. 6—Air intake to the ventilating system. Cover at side of car removed. Note blower runner and arrangement of screens.

the car body adjacent to the transformer. This box also contains additional apparatus as follows: (a) Reverser, (b) limit relay, (3) compensating relay, (d) sequence switch. The unit-switch contacts are enclosed in an arc chute. At the sides of the arc chute adjacent to the contacts are heavy copper blowout coils. These coils are connected to the main circuit in such a manner as to produce a magnetic field, in which the arc, after it is established, will travel outward away from the switch contacts. The arc after once being formed by the switch contacts separating becomes a conductor similar to a coil in the slot of a motor and travels under the influence of this magnetic field. The switch contacts are provided with arcing horns so constructed that as the arc moves outward it is lengthened and is finally broken.

The reverser is of the drum type and determines the direction of flow of current through the main motor fields with respect to the armatures and accordingly determines the direction of armature rotation. The drum is rotated from one position to the other by the action of one of two magnet valves which control the admission of compressed air to the operating cylinders. These magnet valves are energized from the control

of contacts through which one of the control circuits passes. It has a lower setting than the limit relay in order that there will be no simultaneous operation of the two pieces of apparatus.

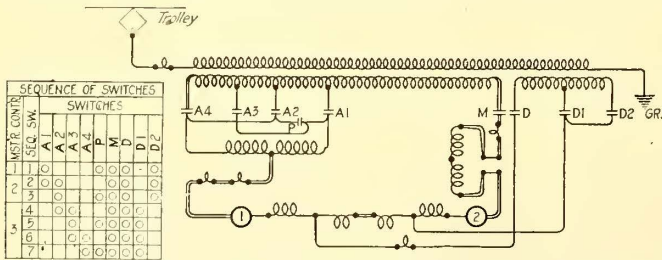
When the car is first started the current in the motor circuit is of such a value that the plunger is raised to the upper position, causing the upper disk to bridge two contacts, thus completing and maintaining the control circuit to the "D2" switch magnet coil. After the car speeds up and the current in the motor circuit falls to a certain value the plunger drops to the lower position and causes the lower disk to bridge the lower two contacts, thus completing the control circuit to the "D1" switch magnet coil. The "D1" and "D2" switch magnet coils are interlocked so that both switches cannot be closed at the same time.

If the master controller was thrown to the last position at all times the compensating relay would not be required and the function of impressing different voltages across the commutating-pole windings of the main motors could be taken care of by contacts on the sequence switch drum. Operating conditions have shown that this is impossible, and since the above feature must be adhered to whether the master controller is in the first, second or third position the application of the relay is imperative.

EIGHT POSITIONS OF THE SEQUENCE SWITCH

The sequence switch is of the drum type and has eight positions, including the zero or "off" position. The other seven positions correspond to the seven point acceleration chart shown in the diagram. The drum has contact plates mounted on it and arranged in such a manner that as it rotates to the various positions certain control wires are connected together, forming the various control circuits required for the proper sequence of the unit switches.

The drum is rotated by the action of two magnet valves which control the admission of air pressure in the two operating cylinders. One of these magnet valves is marked "off" and the other "on." The "off" magnet valve admits compressed air into the operating cylinder when it is de-energized, while the other exhausts it when it is de-energized. Both of these magnet-valve operating coils are de-energized when the master controller is in the "off" position, therefore the drum will always return to the zero or "off" position when neither coil is energized. The "on" magnet coil remains energized as long as the master controller is in any running position. The energizing of this coil causes equal pressure in the two operating cylinders, but will not result in any movement of the drum until the "off" magnet is momentarily energized and the pressure reduced in the corresponding cylinder. The intermittent or momentary energizing of the "off" magnet valve during an acceleration of the car is controlled by the limit relay, which determines the rate of acceleration of the car or train. The operating magnet coil of the "M" switch is interlocked with this drum in such a way that it cannot be energized and the switch closed and power applied to the motors unless the drum is in its "off" position. The corresponding points of the master controller and sequence switch drum are as follows:



SCHEMATIC DIAGRAM OF CONNECTIONS FOR THE SINGLE-PHASE COMMUTATING-POLE MOTOR

circuit and are marked "forward" and "reverse" for corresponding movements of the car or train.

The acceleration of the car is controlled by the action of the limit relay. Its purpose is to prevent the motors from receiving excessive current. With this device the car may be accelerated automatically or semi-automatically at the option of the motorman; that is, if the master controller is placed in the first or second position at the start the sequence drum will progress to its corresponding position, viz., 1 or 3, as the case may be. In case the master controller is thrown to position 3, the drum will progress to position 7 and the entire acceleration will be independent of the motorman. The functioning of the relay due to heavy main motor current through the operating coil delays the progression of the sequence drum and prevents additional switches from closing until the current has fallen to a predetermined value.

This relay consists of a single coil of heavy copper strap, a plunger, frame, disk and contacts through which the control circuit passes. This piece of apparatus is shown in one of the illustrations.

FUNCTIONS OF THE COMPENSATING RELAY

In order to compensate for transformer action in the main motors with armature currents of both large and small values, as are encountered when starting a car and after it is up to full speed, the compensating relay is supplied. It is inserted in the main circuit between the number one motor and the overload relay. It is similar in construction to the limit relay, using the same parts with the addition of one extra disk and set

Master Controller	Sequence Switch Drum
Off	0
1	1
2	3
3	7

The car is provided with two master controllers of the single-handle drum type. Through this device the proper connections are made from the motor-generator set and storage battery to the control train line for operating the magnet valves of the switches in the proper sequence for the acceleration of the car. The supply wire leading from the storage battery switch to the master controller is connected to the "cutout" and "reset" receptacles and this renders the equipment inoperative without the control plug. The controller is provided with an automatic release and will not remain in any running position after the operator's hand has been removed. Moving the handle to the right will set the reverser in the proper position for forward movement of the car and moving it to the left *vice versa*. At the bottom of the master controller are the two push buttons for the operation of the pantograph. The master controller is shown in one of the illustrations.

The wires comprising the control train line are run in one cable throughout the entire length of the car and are connected between cars by jumpers when the car is to be operated in a train. One end of the jumper is permanently connected to the train line in the junction box at each end of the car and the other end is carried in dummy receptacles when not in use. The arrangement is shown in the cut on page 1209.

The car is provided with one switchboard panel located in a cabinet in the vestibule at the motor truck end and has the following apparatus mounted on it: One motor-generator switch, one battery switch, one governor switch, one control cutout switch, one limit relay cutout switch, one blower motor switch (fused), one compressor-motor switch (fused), three heater switches (fused), one automatic heat regulator, four lighting resistor units and fifteen fuses for lighting and auxiliary circuits.

#### DUST SCREEN USED IN VENTILATING INTAKE

The ventilating system for cooling the transformer, preventive coil and main motors is supplied from a blower. The runner for this blower is a 21½-in. single inlet wheel mounted on the shaft of the motor at the end opposite the commutator and enclosed in a steel casing. The motor is of the doubly fed type, supplied with current at 100 volts from taps on the main transformer, and runs continuously. The ventilating air is taken into the system from under the car body through a screening device, as shown herewith. That portion of the ventilating air required for the main motors is taken into the channel beam of the car body and carried forward to the motor intakes.

All of the car and headlight lamps are supplied with current at 30 volts through the various circuits, each of which is protected by a fuse mounted on the panel board. The current is obtained from the motor-generator set and storage battery, as before stated.

Under normal operation of the car at night the lighting system receives its energy from the motor generator, which is adjusted to give approximately the 45 volts required to float the storage battery on the system. The voltage is then reduced to the proper value for the lamps by means of resistance units inserted in the various circuits.

Whenever the motor circuit of the set is not energized, either due to the pantograph being lowered or to the power going off, the resistance units are automatically cut out of the circuits by the functioning of the battery disconnecting relay and the lights burn at the same

degree of brilliancy with current supplied from the battery. At the same time the battery is disconnected from the generator and prevented from feeding it and running it as a motor. The storage battery will supply the lighting system for approximately two hours.

The car has no power bus or lighting train line. Therefore the main motor and lighting circuits are independent of the corresponding circuits on other cars in multiple operation.

## The Milwaukee Electrification\*

### Some of the Important Reasons for the Widespread Interest Which This Great Undertaking Has Awakened

BY F. H. SHEPARD

Director of Heavy Traction Westinghouse Electric & Manufacturing Company

THE most widely known section of railroad track in the world is the electrified section of the Chicago, Milwaukee & St. Paul Railway, now operating over four mountain ranges and crossing the backbone of the American continent. The eyes of the whole world are on it today, and for several important reasons.

It is the first electrification of any stretch of railroad of considerable length on which the operation is exclusively electric; that is, not combined with steam locomotive operation. It is also the first extensive railroad electrification to use hydro-electric power. Other considerations of importance are the great size and power of the locomotives, the use of regeneration on mountain grades, the first use of a 3,000-volt direct current and special provision for the most economical use of hydro-electric power.

The courage with which this undertaking was advanced is one of the amazing things in American railroad history. Electrifications already existing had been confined to comparatively short stretches of road where conditions obtaining due to terminal or grade congestion, tunnel operation or other local conditions had governed. In this case the determination to electrify followed the construction of a new transcontinental route, the underlying reason for the decision to electrify being undoubtedly the earnest desire to adopt the best in operation as a means to develop the best railroad. The availability of power supply at an attractive price from the great electric transmission network of the Montana Power Company was, of course, an important factor as well. But the chief consideration was that wherever electrification has supplanted steam more reliable and better operating conditions have been secured.

The present and potential distribution of power in the State of Montana had already made that State foremost in the use of electric power per capita. The utilization of water power is there seen carried to a high degree. Originating with the storage of the mountain run-off in the great Hebgen reservoir, adjacent to Yellowstone National Park, power is successively generated by plants located along the Madison and Missouri Rivers, the same water generating electric power seven times before its final release.

In this system, which includes the development on the course of the Columbia River, as well as minor water powers on the Yellowstone, there is already installed an aggregate of 300,000 hp., with undeveloped sites for

\*Abstracted from extended article in the Milwaukee Employees' Magazine.

150,000 hp. additional. This is interconnected and distributed by 2,000 miles of high-voltage transmission line, much of which is 100,000-volt line, and serves jointly the mines, cities and railroads of the State.

The exclusion of steam locomotive service from the electrified line of the Milwaukee has secured the operation and maintenance of the electrical equipment in a most efficient manner. While a part of this is due to the skill with which the operation and maintenance of this apparatus is directed, a large part is also due to the zeal and interest of the operating forces. The engine men and maintenance forces have mastered the new power and the details of the electrical apparatus to an amazing degree.

## Illinois Central Electrification Progress

### Making of Plans Only Work to Be Done This Year— Construction of New Power Plant to Handle I. C. Load Started

THE Illinois Central Railroad does not contemplate doing any work in connection with the improvement of the Lake Front in Chicago this year. That is, no work will be done in the way of grading, filling, electrification or terminal station construction. The financial situation and other conditions are believed by the company to be so uncertain as to make it unwise for any railroad company to embark in enterprises necessitating the raising of money on any considerable scale at this time. The only actual work that will possibly be done this season is the subway for foot passengers from the Randolph Street station westward underneath Michigan Avenue. This tunnel is very urgently needed on account of the delay to patrons of the Illinois Central's suburban service in getting across Michigan Boulevard because of the constant stream, especially during the rush hour, of six rows of automobiles. Some studies are being made by a small organization in connection with the electrification project, but there may be no definite decision to report as to type of electrification systems, equipment, etc., perhaps for a number of months.

#### NEW GENERATING PLANT WILL BE READY

In preparation for carrying the load of the Illinois Central Railroad after this is electrified, and also for caring for the very large growth in its business to the south of Chicago, the Commonwealth Edison Company is planning to build a new 180,000-kw. power plant in the southeastern section of the city, which will be known as the Calumet Station. A 40-acre tract of land on the Calumet River, and located at 100th Street and Commercial Avenue, has been purchased as the site of the new plant. The new station will be laid out for six 30,000-kw. turbo generators, of which two will be put in as the initial installation. These two units have just been ordered, one from the General Electric Company and one from the Westinghouse Electric & Manufacturing Company. These will operate at 325 lb. steam pressure with 250 deg. superheat. There will be four Babcock & Wilcox boilers per turbine, each having 15,000 sq.ft. of heating surface and equipped with an economizer having 10,000 sq.ft. of heating surface. The order for the first eight boilers has also just been placed. It is expected that the station will be in operation in the fall of 1921.

Located close to the mouth of the Calumet River, the new power plant will have all Lake Michigan as a water supply. The situation is also favorable in regard to coal, for the Pan Handle Railroad circles the proposed station on the west side and the Chicago Outer Belt Railroad is adjacent to it on the south side. One of the features of the power plant will be the method of handling the coal supply and cinders to and from the boilers. Cars loaded with coal will enter at one end of the plant and the same cars will emerge from the other end loaded with cinders. The details of the station design are not as yet available.

This Calumet Station will make the fourth large generating plant operated by the Commonwealth Edison Company in supplying energy for all the local transportation companies and most of the power and light energy consumers of Chicago. The present three stations are the Fiske and Quarry Streets plants, located in the central part of the city, and the Northwest Station, located in the northwest section of the city. The new station will greatly reduce the line losses involved in supplying the southeast section of the city and provide necessary capacity for the growth of the many industries there.

The station will be well situated for supplying energy not only to the electrified Illinois Central Railroad but to numerous other roads running south and west and east from Chicago, when they later undertake electrification. The total capacity of the present three stations is 489,000 kw.

### Chicago Hearing Concluded

AT THE concluding hearing before the Public Utilities Commission of Illinois, held in Chicago on May 26, on the financial situation of the public utility companies, George M. Reynolds, president of the Continental & Commercial National Bank, Chicago, testified that if public sentiment does not change from its traditional attitude against increases in utility rates it will only be a question of time until the utilities will be unable to function.

Mr. Reynolds said that would be a fatal blow to the development of the city. He also made the point that much could be done to improve the value of utilities securities if the commissions would be quick to recognize the justice of applications for increased rates. He declared that the fact that commissions have not met the changing financial and operating conditions in a prompt and business-like way has had much to do with the decline in the value of utility securities and in the market for them. There has been a tendency to assume that the present period of high prices is abnormal and that it would be unfair to set up rates which would pay a fair return on present operating costs.

Mr. Reynolds thought the fallacy of this view had now been pretty well established, nearly all economists agreeing that the low level of pre-war prices will probably never be reached again, or certainly not for a long time.

A liquid fuel which is being tried out in Great Britain and which is said to promise well is composed of a one-to-one mixture of coal dust and fuel oil. The coal dust is pulverized and treated with a small proportion of soap, fatty acids or other substances which will reduce its tendency to settle in the oil. The fuel has been given the name "Colloil."

# The Federated American Engineering Societies Organized

## Consummation of Many Months' Work of the Joint Conference Committee of the Engineering Societies Results in Successful Association of National, State, Regional and Local Engineering Societies of the Country

**I**N A two-day session held in Washington on Thursday and Friday, June 3 and 4, the representatives of some sixty national and local engineering societies and affiliations of the United States formed an association to be known as The Federated American Engineering Societies. This conference of engineers, representing an aggregate membership of more than 120,000, was the result of plans made after many months of study by the Joint Conference Committee of the four so-called "Founder Societies." This Joint Conference Committee had invited all the various engineering societies and affiliations and allied organizations to send delegates to an organizing conference, the number of delegates sent to be proportional to the strength of the societies sending them, in the proportion of one delegate for each one thousand members, societies having a membership between 100 and 1,000 being allowed one delegate. After frank and complete discussion, a type of organization was agreed upon and a constitution with its accompanying by-laws was adopted to be reported back to the various societies for final ratification.

The object of the federated societies as stated in the constitution is:

Service to others is the expression of the highest motive to which men can respond, and duty to contribute to the public welfare demands the best efforts that men can put forth. It shall therefore be the object of this organization to further the interests of the public through the use of technical knowledge and engineering experience and to consider and act upon matters common to the engineering and allied technical professions.

The whole tenor of the discussion leading up to the adoption of this constitution as the final business act of the conference was in line with this object as finally stated. Discussion on every hand was with an apparent desire to permit engineering to take its legitimate place in the interests of the public.

The meeting was opened by an address by Richard L. Humphrey, chairman of the Joint Conference Committee, a consulting engineer of Philadelphia, Pa. Mr. Humphrey reviewed the work of the Joint Conference Committee which resulted in this engineering conference and urged that the conference visualize a broad plan and not allow itself to get confused by details. He made a strong plain talk outlining the ideals with which the Joint Conference Committee had worked. In outlining the chief elements he said, in part:

This is an auspicious occasion and is fraught with great potentialities for strengthening and advancing the engineering and allied technical professions in this country. It is one of the most important gatherings that has ever been planned; it can be considered a success if harmony is its outstanding characteristic, for it is only through harmony that we may achieve the results that ultimately result in the greatest success.

We are met not to discuss details but to use our best endeavors to reach a harmonious agreement as to fundamental principles. This occasion, to be properly utilized, must deal with the fundamental principles involved and leave the working out of the details of whatever plan that

may be agreed upon to the governing board of the new organization.

I would suggest that this problem be approached with an open mind and that the discussion be on a broad, unselfish plane, having one object, namely, the good of the engineering and allied technical professions.

I believe that the keynote of this conference could be properly expressed by the word "service"; we desire first to serve the country, and, second, to serve the societies and organizations of which we are the representatives. One cannot contemplate service, which means giving—not receiving—with any feeling that it is actuated by selfish motives, but rather is it the giving of our best.

Lieut.-Col. Charles W. Kutz, U. S. A., Engineer Commissioner of the District of Columbia, then welcomed the conference on behalf of the District and also of the six local engineering organizations. He mentioned that engineers had in the past neglected team work and in things engineering were for themselves, like the unshod blacksmith's mare and the unshod shoemaker's child.

Calvert Townley, president of the American Institute of Electrical Engineers, and J. C. Hoyt, one of the representatives of the American Society of Civil Engineers, were elected respectively permanent chairman and permanent secretary of the conference, and Mr. Townley distinguished himself during the next two days in a masterly administration of the duties of his office during several interesting parliamentary debates.

The morning session of June 3 was entirely devoted to debate, on the following resolutions, which were finally adopted unanimously:

*Resolved*, That it is the sense of this conference that an organization be created to further the public welfare where technical knowledge and engineering experience are involved and to consider and act upon matters of common concern to the engineering and allied technical professions, and

*Resolved*, That it is the sense of the conference that the proper organization should be an organization of societies and affiliations and not of individuals.

In the afternoon addresses were heard under the subject of "The Functions of the Engineer in Public Affairs" by Arthur P. Davis, president of the American Society of Civil Engineers and Director of the United States Reclamation Service, and Philip N. Moore, past president of the American Institute of Mining and Metallurgical Engineers, now of the War Minerals Relief Commission; also on public highway questions, such as "Federal Aid Roads" by Thomas H. MacDonald, Chief of the Bureau of Roads and Road Engineering, and the "Economic Value of Good Roads" by W. D. Uhler, Chief Engineer of the Pennsylvania State Highway Department.

One of the most interesting sessions was held Thursday evening, at which three addresses were given. The first was on "Co-operation of the Engineer and the Business Man in Public Affairs," an exceptionally able discussion by Homer L. Ferguson, past president of the United States Chamber of Commerce and president of the Newport News Shipbuilding Company.

The second address was "The Value of Publicity for the Engineer" by James H. McGraw, president of McGraw-Hill Company. Mr. McGraw showed how publicity in the past has not fitted the engineer's type of mind, at least publicity which the engineer himself must make.

But today things are different and the engineer has a wonderful opportunity for the right type of publicity. Engineers and engineering activities are more than ever in the minds of the public, which is ready to have them dramatized. The engineer is more and more taking the place of the pioneer farmer, the lawyer or business man as a hero in fiction. Such facts can be capitalized and the opportunity taken to impress upon the public how great a factor of today's civilization the engineer really is.

In working out some of these problems of making the engineer class conscious, of bringing out his human as well as his technical qualities and of placing him and his works in their true light in the public eye, Mr. McGraw showed the place of the popular and news press, and particularly of the technical press. He pledged the technical press to a constant service to the engineer and his works and to establishing a common understanding of the needs of all engineers.

In line with the principles of Mr. McGraw's address, the conference adopted on Friday as a part of the constitution and by-laws a publicity platform of far-reaching significance:

#### CONSTITUTION

##### Article X. Publicity

The organization shall stand for the principle of publicity and open meetings under such regulations as may be provided for in the by-laws.

#### BY-LAWS

##### Chapter 4. Publicity

SEC. 1. The privilege of attendance at all meetings of the American Engineering Council, of the executive board and committees, when not in executive session, shall be extended to any proper person, but this privilege does not extend the right to speak or vote. Any proper person shall have the right to inspect and make true copies of the record of all meetings of the council, executive board and committees.

SEC. 2. The committee on publicity and publications may employ a publicity secretary, whose duty, under the direction of the executive board, shall be to prepare and supply to the engineering, technical and general press news from the Federated American Engineering Societies and of the engineering world, and to co-operate with the editors of engineering and technical publications in disseminating information in regard to this organization and its activities. The committee on publicity and publications may appoint a co-operating board of engineering editors to counsel or assist in any or all of its activities.

The third address was "The Engineer and National Prosperity" by George Otis Smith, Director of the United States Geological Survey, who said in one place that "my political conviction is that the future of our nation will be largely what you engineers make it, and national prosperity must be worked out in terms of the nation's industry."

The Thursday evening session was followed by a smoker tendered by the Washington Society of Engineers and the affiliated organizations.

On Friday morning, June 4, the report of the committee on constitution and by-laws was heard and most of the day was devoted to a discussion of the details of the constitution and by-laws. This committee, which, like the other committees of the conference, was large and representative, had done an excellent piece of work and what it had prepared was adopted after much

searching debate, but without much alteration. The constitution is a general instrument without unnecessary detail. It provides for membership as follows:

#### Article III. Membership

SEC. 1. SCOPE—The membership shall consist of national, local, state and regional engineering and allied technical organizations and affiliations, classified as follows:

1. National engineering and allied technical organizations.
2. Local, state and regional engineering and allied technical organizations other than local associations, sections, branches and chapters of national organizations.
3. Affiliations consisting of any one, or a combination, of the following constituents: (a) Local sections and associations of members of national organizations included under (1). (b) Local engineering and allied technical societies and clubs, not of national scope. (c) Local engineers and members of allied technical professions and their associates.

It provides that the management of the organization shall be vested in a body to be known as the "American Engineering Council" and its executive board. Representation on this council consists of representatives from the various national, local, state and regional organizations and affiliations to the extent of one representative for a membership of from 100 to 1,000 inclusive and one additional representative for every additional thousand members or major fraction thereof. An executive board of thirty members of the council, consisting of the six elected officers of president, four vice-presidents and treasurer and twenty-four others representing national and local societies in proportion to the total membership in the national and local societies, is provided, and charged with conducting the business organization under the direction of the council.

The finances of the organization are provided by contributions from the member societies, each national society contributing \$1.50 per individual member and each local, state and regional organization and affiliation contributing \$1 per individual member.

During the Friday sessions an address on the subject of "The Engineer in Public Affairs" was made by L. K. Sherman, president American Association of Engineers and president United States Housing Corporation, and one on "Rendering Service" by F. H. Newell, past president American Association of Engineers and professor of civil engineering at the University of Illinois. Another interesting talk was by J. H. Strong, when he explained the vote of "present" of the American Association of Engineers on the adoption of the constitution. He voiced the sentiment of his association as being for harmonious action for the best interests of the engineer and for the fullest co-operation with the rest of the engineers, but said the association delegates present could not interpret their duty to say that A. A. E. would join the federated societies as now outlined.

Friday evening three addresses were given, on "Education of the Engineer for Public Service" by Robert S. Woodward, president Carnegie Institute, Washington; "Engineering Research and National Progress" by James R. Angell, chairman National Research Council, Washington, and "The Executive in Engineering" by Samuel M. Vauclain, president Baldwin Locomotive Works, Philadelphia. Mr. Vauclain's address was especially full of inspiration. He described the kind of work of an executive and showed how by nature the engineer fits such a position. He said he has confidence in the engineer because the engineers of America have never fallen down on anything they have undertaken. Mr. Vauclain graphically illustrated his conception of the engineer executive by quoting several interesting



experiences of his own in getting things accomplished during the war.

Four important resolutions were unanimously adopted at the close of the business sessions of the organization conference:

1. Urging the payment of adequate salaries for the teachers of engineering in our technical institutions in order that adequately trained young engineering talent may be made regularly available.

2. Advocating the immediate adoption of appropriate measures to give effect to the recommendations made to Congress by the commission which recently reported upon a more adequate salary schedule for the engineering and other technical services of the federal government.

3. Indorsing the bill which has for some time been under consideration by Congress for the creation of a Department of Public Works.

4. Expressing the appreciation of the organization conference for the valuable work of the Engineering Council, especially its offers of assistance in making effective and operative the newly devised plan of organization, and expressing thanks to the Washington Society of Engineers and the Cosmos Club for their courtesy and assistance afforded during the sessions of the conference.

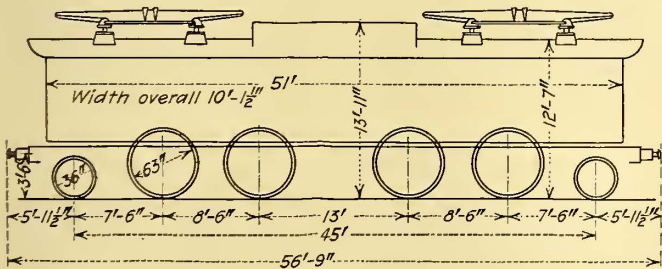
The Joint Conference Committee, which had so successfully formulated plans for the present conference, was charged with the duty of perfecting the permanent organization provided by the constitution. This committee is composed of members from the four "Founder societies" and has its headquarters at Engineering Societies Building, New York. Richard L. Humphrey, consulting engineer, Philadelphia, is chairman.

## Locomotive for Paulista (Brazil) Electrification

3,000-Volt, Direct-Current System, with Provision for Regenerative Braking, Will Soon Be Installed—Vacuum Train Brakes to Be Used

THE Paulista (Brazil) Railway has under way the electrification, at 3,000 volts, direct current, of the double-track line between Jundiahy and Campinas. Brief articles on this electrification were printed in the issues of the ELECTRIC RAILWAY JOURNAL for April 24, pages 855 and 878, and May 8, page 972.

Further information is now available as to details of the locomotives, which will be supplied by the West-



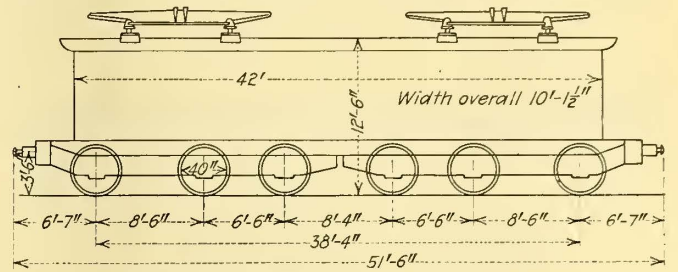
GENERAL ARRANGEMENT AND PRINCIPAL DIMENSIONS PASSENGER LOCOMOTIVE

inghouse Electric International Company for passenger and freight services respectively, both types of these locomotives being arranged for regenerative braking.

Each passenger locomotive will have two main running gears, each with a 2-4-0 wheel arrangement. These will be coupled back to back through an articulation link and will support a single cab. A two-wheel radial guiding truck and two driving axles in a rigid wheelbase will be included in each running gear. The two-wheel guiding truck will be of the Rushton side-equalized type. The locomotives will weigh 121 tons each and the details will be as given in Table I.

Each driving axle will be equipped with a twin-armature motor with quill drive. The pinion on each motor shaft will drive a single gear, mounted on a quill, which is centered in bearings in the motor frame and surrounds the drive axle. The motors will have forced ventilation, and each twin will have a one hour rating of 500 hp. and a continuous rating of 400 hp.

The nominal rating of the locomotive will be 2,000 hp., corresponding to a tractive effort of 17,000 lb. at 44 m.p.h. The maximum starting effort will be 44,000 lb. and the maximum speed 65 m.p.h.



DIAGRAMMATIC ELEVATION OF FREIGHT LOCOMOTIVE

Eight armatures per locomotive will be available for different motor combinations. The two armatures of each motor will be connected permanently in series and will be arranged to secure three motor combinations as follows: (1) All in series, giving one-quarter speed. (2) Two in series and two in parallel, giving one-half speed. (3) All in parallel, giving full speed.

In each of the three motor combinations the motor fields will be tapped, thus providing a total of six operating speeds. Shunt transition will be used in passing from one combination to another. The method of re-

TABLE I—CHARACTERISTICS OF PASSENGER LOCOMOTIVE

Classification	2-4-0 + 0-4-2
Length over buffers	59 ft. 9 in.
Length over cab	51 ft.
Total wheelbase	45 ft.
Rigid wheelbase	8 ft. 6 in.
Diameter of driving wheels	63 in.
Diameter of guiding wheels	36 in.
Weight of complete locomotive	242,000 lb.
Weight of mechanical parts	123,000 lb.
Weight of electrical equipment	119,000 lb.
Weight per driving axle	45,375 lb.
Weight per guiding axle	30,250 lb.

generation will be somewhat similar to that used on the Chicago, Milwaukee & St. Paul locomotives built by the Westinghouse company, but axle generators will not be used. Regeneration will be available in each of the three combinations.

Power for the auxiliaries and control will be obtained from the line through a motor-generator set, delivering current at approximately 80 volts to the blowers, air compressors, light and control. This motor generator will also furnish excitation for the main motor fields during regeneration.

The braking system will differ from the usual type used throughout this country in that train vacuum brakes will be used instead of air brakes. The vacuum exhauster on the locomotive will have a capacity great enough to operate the brakes on the entire train. In addition to this exhauster a small compressor will be installed to supply compressed air to operate the locomotive brakes and control. Both the air and the vacuum brakes may be used at the same time. The use of the small compressor permits cutting out the large exhauster when the locomotive is switching or running light.

Each freight locomotive will have two main running gears, each with three driving axles in a rigid wheel-

base. The two running gears will be coupled through an articulation link. The total weight of the freight locomotive will be 94 tons. Table II gives the general physical characteristics of the freight locomotive.

The motor equipment will consist of six single-armature geared motors, with a one hour rating of 250 hp. and a continuous rating of 200 hp. with forced ventilation. These ratings are at a potential of 1,500 volts and the motors will be connected two in series.

The nominal rating of the locomotive will be 1,500 hp., corresponding to 25,500 lb. tractive effort at 22 m.p.h.

TABLE II—CHARACTERISTICS OF FREIGHT LOCOMOTIVE

Classification	0-6-0 + 0-6-0
Length over buffer	51 ft. 6 in.
Length over cab	42 ft.
Total wheelbase	38 ft. 4 in.
Rigid wheelbase	15 ft.
Diameter of driving wheels	40 in.
Weight of complete locomotive	188,000 lb.
Weight of mechanical parts	99,500 lb.
Weight of electrical equipment	88,500 lb.
Weight per driving axle	31,333 lb.

The maximum starting effort at 25 per cent adhesion will be 47,000 lb. and the maximum speed 40 m.p.h.

The six armatures will be arranged in the following three combinations: (1) All in series, giving one-third speed; (2) three in series, two in parallel, giving two-thirds speed; (3) two in parallel, three in series, giving full speed. Field control will be provided in each combination, as on the passenger locomotive, and the regenerative scheme will be similar to that on the other locomotive, as will also the auxiliaries, control equipment and brake equipment, using duplicate apparatus units.

As will be remembered from the previous articles the Paulista electrification equipment will be furnished part by the General Electric Company and part by the Westinghouse Company. General information regarding the G. E. locomotives was contained in the first two articles mentioned above.

for convenient reference and discussion. The data will supplement those given in last year's report and will serve as standards of reference for estimating the economy of operation in plants of various sizes. The meeting was attended by Chairman A. B. Stitzer, New York City; H. E. Davis, Utica, N. Y.; A. H. Kruesi, Schenectady, N. Y.; F. A. Scheffler, New York City; E. H. Scofield, Minneapolis, Minn.; W. C. Slade, Providence, R. I.; H. B. Reynolds, New York City, and C. E. Bailey.

The three-day session of the power distribution committee was a strenuous one, as it was taken up almost entirely with detailed study of specifications, made with a view to suggesting necessary revisions. On account of the thoroughness with which details were considered, a vast amount of valuable technical information was brought out, which will doubtless be reflected in the discussion at Atlantic City. With but two exceptions all members of the committee were able to be present as follows: Charles R. Harte, New Haven, Conn., chairman; C. C. Beck, Mansfield, Ohio; R. W. Eaton, Providence, R. I.; H. H. Febrey, New York City; C. J. Hixson, Schenectady, N. Y.; Charles H. Jones, Chicago, Ill.; J. H. Libbey, Boston, Mass.; F. McVittie, Rochester, N. Y.; M. B. Rosevear, Newark, N. J., and W. Schaake, Pittsburgh, Pa.

### Claims Association Committee Meetings

AT THE New York headquarters on May 28 meetings were held by the Claims Association committee on revision of the constitution and by-laws and on interchange of claims statistics. The members in attendance were H. D. Briggs, Newark, N. J.; W. F. Weh, Cleveland, Ohio; J. S. Kubu, Utica, N. Y., and John J. Reynolds, Boston, Mass.

The purpose of the first-named committee is to revise the constitution and by-laws of the Claims Association so as to have it conform with the revised constitution of the parent association. The points needing revision were gone over at the meeting and arrangements were made for the preparation of a revised copy to be submitted to the executive committee of the Claims Association.

The committee on statistics arranged for a questionnaire to be sent out on the subject regarding which statistics can profitably be interchanged among the companies. The results will be compiled at the association office and furnished members only on request.

### Publicity Men in Conference

A MEETING of the committee of publicity men was held at the association offices in New York on June 5 for the purpose of considering a program of work to be carried out in addition to that already under way, and for the further purpose of considering the matter of co-ordination of its work with that of the committee on publicity recently appointed.

President Pardee, who sat with the committee, explained that the function of the newly appointed committee on publicity is to act in matters involving the publicity policy of the association, and in the appointment of the committee it was the purpose that the work of the two committees should be closely co-ordinated. Mr. Pardee advised the committee that the following executives had been invited to serve as members on the committee of publicity: Barron G. Collier, president Barron G. Collier, Inc., chairman; Horace

## Association News

### Engineering Committees Whipping Reports Into Shape

ASSOCIATION headquarters have been the scene of much activity of late, Engineering Association committees being particularly in evidence. The equipment committee met on June 3 and 4, the heavy traction committee on June 4, the power generation committee on June 7 and the power distribution committee on June 8, 9 and 10. The way committee will meet on June 14 and 15.

At the meeting of the heavy traction committee, Chairman Sidney Withington, New Haven, Conn.; L. S. Wells, New York City, and J. C. Davidson, Roanoke, Va., were in attendance. The committee studied the results of a canvass made by means of a questionnaire, showing heavy electrical equipment on steam railroads, and arranged for the preparation of the data in useful and attractive form in the report. A salient feature of the committee's work this year, as previously, is to be the furnishing of adequate information on progress in heavy traction to the membership of the association.

The committee on power generation received reports from its sub-committees and devoted most of its time to the form in which power plant data will be presented

Lowry, president Twin City Rapid Transit Company; Britton I. Budd, president Metropolitan West Side Elevated Railway; C. D. Emmons, president United Railways & Electric Company; C. B. Buchanan, vice-president Virginia Railway & Power Company, and Frank Hedley, president and general manager Interborough Rapid Transit Company.

The general sentiment was that an arrangement of this kind would prove mutually helpful to the publicity men and executives in that ideas and policies could be readily correlated. The committee discussed the program of work suggested and agreed to collect information as to campaigns conducted by various companies on specific subjects. A form of questionnaire was agreed upon and will be sent out from the association headquarters. Another meeting of the committee will be held in July, at which time replies will be gone over and a report prepared.

There was also discussed the matter of an exhibit at the coming convention and the chairman designated Mr. Burroughs to have charge of the details of this exhibit.

Those present at the meeting besides President Pardee were: Leake Carraway, Virginia Railway & Power Company, chairman; Luke Grant, Chicago Elevated Railways, vice-chairman; W. Dwight Burroughs, United Railways & Electric Company, Baltimore, Md.; W. P. Strandborg, Portland Railway, Light & Power Company, Portland, Ore., and Prof. James T. Grady, Brooklyn City Railroad, Brooklyn, N. Y., members; and E. B. Burritt, secretary; W. Caryl Ely and Perry Arnold of Barron G. Collier, Inc., and J. W. Welsh and Henry Surguy of the American Association.

### Purchasing Agents and Storekeepers Will Meet

A MEETING of the purchasing agents and storekeepers with a program of discussion on topics of interest to them at the Atlantic City convention next October is assured.

President E. R. Hill of the Engineering Association has appointed W. H. Staub, purchasing agent of the United Railways & Electric Company of Baltimore, and P. F. McCall, general storekeeper of the Metropolitan West Side Elevated Railway, Chicago, as a committee to prepare a program for a meeting of purchasing agents and storekeepers to be held in connection with the coming convention of the Engineering Association at Atlantic City, Oct. 11 to 15. It is believed that such a meeting, with a program dealing with matters directly affecting the work of these departments, will prove of great interest and benefit to purchasing agents and storekeepers throughout the industry.

Messrs. Staub and McCall are now at work on this program and would welcome suggestions from purchasing agents and storekeepers throughout the industry as to matters which should be discussed. Purchasing agents should communicate direct with Mr. Staub and storekeepers with Mr. McCall.

The field of work before purchasing agents and storekeepers under present conditions is of such importance that it is highly desirable that an opportunity be afforded for a gathering of the heads of these departments of member companies for a discussion of the subjects to be presented in the program and such other topics of interest as may come before the meeting.

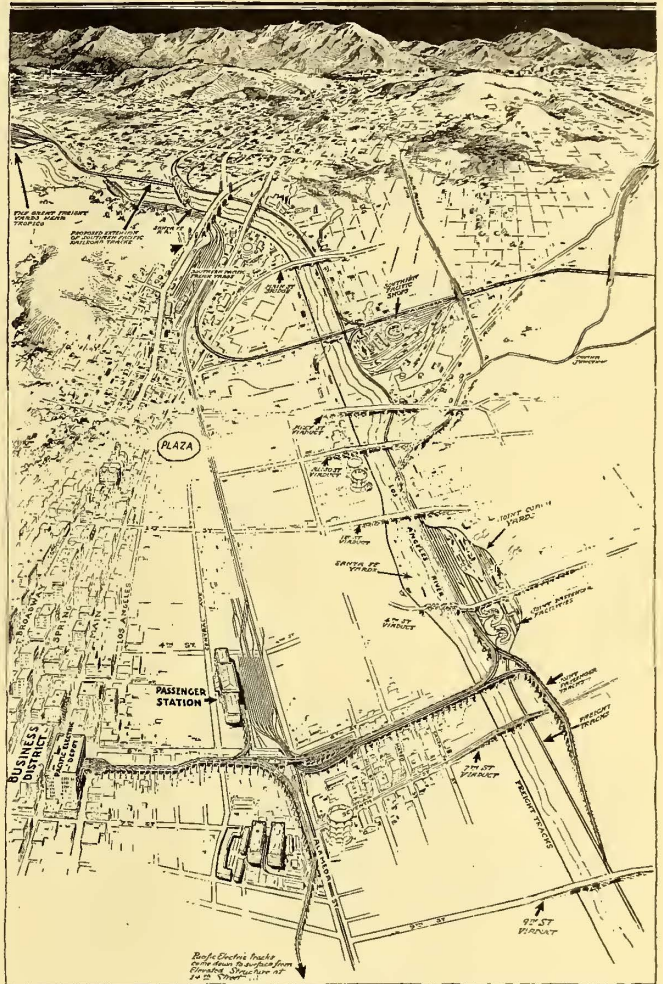
The committee bespeaks the co-operation and assistance of all purchasing agents and storekeepers.

## \$6,000,000 Joint Station Proposed

The Southern Pacific, Los Angeles & Salt Lake and Pacific Electric Lines Offer New Terminal Plans in Los Angeles

PREVIOUS issues of this paper have described the proposed Plaza Terminal for a union depot for all railroads entering Los Angeles, as recommended by the California State Railroad Commission on July 31, 1919.

The report of the Railroad Commission's chief engineer discusses three possible sites, namely, the Plaza site, the Southern Pacific Company's site and the Santa Fé site, the last being dismissed as not being desirable for use as a terminal.



SKETCH SHOWING PROPOSED UNION STATION AT LOS ANGELES AS RECOMMENDED BY THE SOUTHERN PACIFIC COMPANY, LOS ANGELES & SALT LAKE RAILROAD AND PACIFIC ELECTRIC RAILWAY

The accompanying illustration shows the location of station and arrangement of tracks recommended by the Southern Pacific, Los Angeles & Salt Lake Railroad and Pacific Electric Railway.

Among the advantages urged in favor of this plan are the following:

Its estimated ultimate cost is \$16,809,000, with an immediate expenditure necessary of \$6,441,000, as against, for the Plaza site, ultimate cost \$25,397,000 and immediate expenditure \$15,666,000.

While both plans provide for grade crossing elimination, the proposed site blocks street traffic less than the Plaza site. The station would be located closer to the active business district than if built at the Plaza.

From a railway operating standpoint the proposed location simplifies many problems.

# News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

## Portland Arbitration Closed

Maine Board Will Meet in Executive Session on May 12—Hearings Ended

C. F. Berry, treasurer of the Cumberland County Power & Light Company, Portland, Me., was called recently in the arbitration in connection with the readjustment of the compensation of the trainmen of that company. It was brought out that the Cumberland County Power & Light Company does not own the Portland Railroad, but merely leases it at a rental of 5 per cent. Judge Joseph E. F. Connolly, arbitrator for the company, was inclined to regard the men as well paid for the service which they performed. He thought that the sensible thing for the men to do, if they were not satisfied, was to seek other employment, or to wait until affairs cleared up and not crowd the company at this time.

Mr. Berry presented the following comparative statement of income:

	Year Ended Dec. 31, 1917	Year Ended Dec. 31, 1918	Year Ended Dec. 31, 1919	Four Mos. Ended Apr. 30, 1920
Gross income	\$1,185,597	\$1,216,357	\$1,513,500	\$467,839
Operating expenses	900,100	993,820	1,244,210	464,505
Taxes	60,650	72,284	85,964	31,845
Net income	\$224,846	\$150,252	\$183,325	\$19,510
Interest and discount	156,567	160,557	163,720	82,869
Dividends (5 per cent)	99,950	99,950	99,950	33,316
Surplus	\$31,670	\$110,255	\$880,344	\$135,696

In his testimony he stated that if the company had a good season this summer, the company's deficit might be cut down between \$50,000 and \$60,000 at the end of the year.

Mr. Vahey cross-examined Mr. Berry. Mr. Berry stated that it had cost the company \$35,000 more this year than ever before on account of snow alone. He also stated that the Sunday and holiday business was not as good on the electric now as it was ten years ago, as the automobile had proved a formidable competitor.

Edward W. Cobb, an operator of a one-man car on the local system, stated that he had been an employee of the company for fourteen years. He contended that he had not been able to save any money during his service with the railroad.

In the cross-examination that followed Judge Connolly for the company endeavored to show that Mr. Cobb was not compelled to operate a one-man car, but did so on his own wish. The witness said that his pay averaged \$33.25 per week. Testimony was also offered regarding the work of spare men and their compensation.

1218

The hearing in the Portland case is closed and the board will meet in executive session on June 12.

## Strike Prevention Recommendations Go to Vote

Organization members of the Chamber of Commerce of the United States were asked on June 10 to vote on two recommendations submitted by the Chamber's Committee on Public Utilities. Those recommendations are that:

Strikes by employees of all public service corporations, performing public service essential to the lives, health, well being and comfort of the people, should be explicitly prohibited by law.

Suitable tribunals should be created by the law to adjudicate differences between employees of public service corporations and their employers, and the decisions of such tribunals should be final and binding upon both parties.

The subject came before the Chamber from the Merchants' Association of New York and the presidents of the principal business organizations of New York City. The communication from the presidents of the New York busi-

ness organizations to the parent body, dated April 19, was signed by Alfred E. Marling, president of the Chamber of Commerce of the State of New York, and officers of other trade bodies.

The referendum will go before 1,300 commercial and trade organizations. It is accompanied by a report of the chamber's committee on public utilities, of which Lewis E. Pierson is chairman. Among other members are: Henry G. Bradlee, Boston; Arthur W. Brady, Anderson, Ind.; J. W. Lieb, New York.

In recommending the proposals for a referendum, the committee expressed its belief in a set of principles which included the following:

Strikes by employees of public service corporations should be prohibited by law as conspiracies against the paramount rights of the public. It is obvious, however, that the great class of employees thus deprived of the power of self-protection by means of the strike should be otherwise protected against unjust relations with their employers through suitable tribunals empowered equitably to adjust differences, whose findings should be final, and supported by due provision for enforcement.

The committee believes that the conditions contained in the Cummings railroad bill or similar provisions against interference with the orderly conduct of the railroads should govern utilities.

## Wages Before Commission

Railway Board Will Determine Whether Omaha Company Can Meet Trainmen's Demands

The Omaha & Council Bluffs Street Railway, Omaha, Neb., is endeavoring to arrive at an agreement with the local carmen's union, which has made a demand for an increase of 13 cents an hour. The men, through a committee, orally agreed to submit the case to the State Railway Commission, the understanding in conference being that if the commission ruled that the company is unable to meet the increase the men would not strike.

## UNION COMMITTEE BALKS

When the company asked the union committee to sign the proposed agreement the committee unexpectedly announced that it would not subscribe to such an agreement; that if the company was unable to meet the increase, the rate of fare should be increased. Thereupon, the company officials announced that it would not be a party to another increase of fare.

The State Railway Commission has indicated a willingness to review the case to determine whether the men are receiving a sufficient wage and whether the company's financial condition warrants an increase.

W. A. Smith, president, and R. A. Leussler, vice-president and general manager, of the company, in reply to the union men, asserted that earnings and expenses, from Aug. 1, 1919, to April 1, 1920, did not yield a 5 per cent return on the preferred stock, to say nothing of the common stock. In another case now pending the State commission ruled that the company should be allowed to pay dividends equal to the average paid during the last five years.

## COMPANY COURTS FINANCIAL INQUIRY

The company is agreeable to place its books before the commission, which the Nebraska Supreme Court has ruled is the only body having jurisdiction over the Omaha traction lines.

The wage scale now in force in Omaha is 53 cents an hour for first three months, 55 cents for next nine months, and 57 cents after first year of service. A year ago the men went on strike and were granted an increase of 10 cents an hour. On Aug. 10, last year, the Railway Commission allowed the company to charge a 7-cent fare, or four tickets for 25 cents. At that time the company granted the men another increase of 2 cents an hour.

During the controversy which has been in progress this week the company asserted that the men have received a total increase of 108 per cent since Jan. 1, 1917.

The Railway Commission is holding in abeyance the increased fare order issued last August, and pending a settlement of that rate the commission ordered the company to submit a physical valuation, including unit prices and costs of materials, for a period of five years. The company has been working on that report for several months.

The local union claims a membership of 961. Contrary to usual procedure, the union officers did not announce the recent vote of the men which they stated authorized them to call a strike. The company claimed to hold the signatures of 300 who were opposed to a strike.

The Railway Commission will be requested to hold a prompt review of the demands of the men and the company's plea of inability to meet the demands which have been made.

### Rochester Wage Arbitration

Arguments for an increase in wages from 45 cents to 85 cents an hour and a forty-eight-hour week were advanced at the initial hearing in the wage controversy between the New York State Railways and its employees in Rochester, Syracuse and Utica, on June 7, in the Court House in Rochester.

Former Supreme Court Justice Arthur E. Sutherland presided. With him on the bench were B. E. Tilton, arbitrator for the company, and James H. Vahey, general counsel for the Amalgamated, arbitrator for the men. Attorney Warnick Kernan, Utica, appeared for the railway, with W. P. Gannon, Syracuse, and Willis A. Matson, Rochester. The Amalgamated was represented by business agents of the three branches.

The men based their pleas for an increase on the rising cost of living. They asked that their wages "be adjusted proportionately." Mr. Vahey stated that the War Labor Board had awarded electric railway employees in other cities a minimum of 51 cents an hour on May 1, 1919. Mr. Vahey said that if the theory was accepted that a man and wife and three children constitute the average family, then the decision to be made by the arbitration board would directly affect 15,000 persons.

In conclusion Mr. Vahey stated that he considered \$2,500 a year to be "a fair wage, a living wage," for the trolley workers. Warnick Kernan, counsel for the company, will outline the case of the New York State Railways at the next meeting. W. J. Lauck was questioned by Mr. Vahey as to investigations conducted by him into the soaring costs of living while he was a member of the industrial investigating commission appointed by President Wilson.

## Municipal Ownership Talk at Toledo

### \$7,000,000 Would Be Placed in the Hands of Council Under the Latest Plan Suggested

Twin ordinances providing for the municipal ownership of a transportation system at Toledo, Ohio, have been submitted by the commission appointed by Federal Judge Killits and are now in the hands of the Council committee on railroads. The ordinances provide for bond issues aggregating \$7,000,000. They are worded in such a way as to be identical except that one provides \$3,000,000 to acquire a transportation system and the other provides \$4,000,000 for the construction of a transportation system.

**T**HE plan of the commission calls for the sale of this amount of thirty-year 6 per cent bonds with the general tax duplicate of the city as a pledge. The money will then be expended by the Council on a plan presented within sixty days by a commission appointed by the Mayor to outline the details of Toledo's new transportation system. In the minds of the commission members the new system would be centered about the most productive lines of the present railway system, with some extensions, new lines and perhaps an auxiliary bus system.

#### TWO ORDINANCES PRESENTED

The two ordinances were submitted when it was thought that one covering both subjects might be a source of legal trouble later and when it seemed that there would be no agreement with Henry L. Doherty on the cost-of-service ordinance which is near completion. Only a few points remain in question on the cost-plus plan.

After five months of work the municipal ownership commission has offered no definite plan of a transportation system to the City Council, but has merely handed over a carte blanche proposal that the Council have \$7,000,000 placed at its disposal with which to buy and construct a new transportation system.

The law department of the city has given Councilmen to understand that the city has the right to condemn and acquire any portion of the existing lines without reference to lines not wanted. There would probably be strong opposition to any such procedure on the part of the city because lines not bought by it would probably be rendered valueless by such action.

Some members of the Council committee on railroads, which now has charge of the bills, want the cost-of-service plan to be submitted to voters at the same time the municipal ownership plan comes up for a vote. They believe that Mr. Doherty will agree to a measure that the people may have a chance to express their preference.

#### AGAINST EXPENDITURE BY COUNCIL

Both plans must be passed by committees and by a two-thirds vote of the Council before June 10 if they are to be submitted, as planned, at the special election to be held in connection with the state primaries on Aug. 10.

The idea of a commission to plan the street railway system to be assembled by the city, according to the plans of the Municipal Ownership Commission, is embodied in a third ordinance. The

Mayor will appoint three citizens to draw up all plans for rerouting, elimination of present lines, building of new ones and routing bus lines.

#### VALUATION NOT AGREED UPON

The ordinances say "that in order to provide an amount sufficient to pay the interest on said bonds and to provide a sinking fund for their final redemption at maturity there shall be, and there is hereby ordered levied, on all the taxable property of the city, in addition to all other taxes, a tax sufficient to create such sinking fund" and pay interest.

No cost-of-service measure will be submitted to the voters unless Mr. Doherty and other officials of the Toledo Railways & Light Company agree to its provisions. The valuation is practically the only question which has not been agreed upon in the private conferences held by members of the commission, business men and Mr. Doherty. Efforts are planned to try to revive the cost-of-service plan. This measure was considered dead last week.

Councilman Irwin of the committee on railroads and Councilman Dennis, an associate, are urging more time, and possible postponement, of the vote on the proposed ordinances, so that both cost-plus and public ownership plans might be submitted simultaneously.

Mr. Doherty has not given notice of his intention of pressing the 10-cent fare cross-bill in the federal court. This may come on rapidly to establish a precedent for any condemnation proceedings which might be taken if the municipal ownership plans are adopted.

### Agitators Busy in California

Union organizers have been making trouble in northern California. A few weeks ago they secretly organized the railway employees at Stockton and induced them to strike and present their demands afterward, the demands including recognition of the union and certain other concessions. This strike tied up traffic for about two days.

A more serious situation developed in Fresno recently. On June 3, the sixth day of the strike, service was 90 per cent restored with some of the old men returned and a number of new men imported for operating the cars. The methods and demands of the strikers were very much the same as at Stockton. The company refused to recognize the union or make any other concessions demanded.

## Seattle Has a New Sensation

### Political Turmoil Over Purchase of Local Electric Railway by City— Investigation of Deal Planned

Mayor Hugh M. Caldwell's determination to inquire into the purchase by the city of Seattle of the traction lines of the Puget Sound Traction, Light & Power Company for the sum of \$15,000,000 has resulted in the passage of an ordinance by the city utilities committee of the Council, appropriating \$10,000 for the investigation. The Mayor himself is asked to undertake the investigation. It is expected the ordinance will be passed by the Council. The Mayor has agreed to undertake the investigation, although he preferred that it be done by the law department.

**T**HE proposed investigation has developed a spirited exchange between Mayor Caldwell and former Mayor Ole Hanson, who was in office when the deal was made. Mr. Hanson declares that the present Mayor "seeks to break faith with the people" when he suggests that the deficit in the railway fund be made up by taxation, and that such action "should be resented by every honest man in Seattle." Mr. Hanson declares that "the street car rider must pay his fare." He declares that Mayor Caldwell, by reason of the fact that he was Corporation Counsel at the time of the purchase, knows more about the deal than any other man in the city hall.

#### GAVE ONLY LEGAL ADVICE

Mayor Caldwell says that his connection with the deal was purely in the matter of giving legal opinions of the city's power to make the purchase. By no means did anything that he said constitute a recommendation on his part that the city should complete the deal and pay the price named. Mayor Caldwell alleges that the lines were purchased at the company's figure without an adequate appraisal.

Mr. Hanson points out that an emergency existed; that transportation had completely broken down; that the government was compelled to run free steam trains to the shipyards, and, finally, that the proposition was approved by the people by a vote of almost four to one.

#### AGAINST TAX MEASURE

The board of trustees of the Chamber of Commerce has gone on record as opposing the proposal to meet the annual deficit of the municipal railway by direct taxation, declaring that to assess any part of the cost of maintaining the system against the general taxpayer would mean that thousands of home owners who pay carfare for themselves and their families would be compelled to contribute further to the support of the railway, were direct taxation resorted to, thereby being burdened for the benefit of transients and non-taxpayers. The board also expresses the opinion that such an action would be a breach of faith on the part of the city, since the ordinance for the purchase of the railway provided specifically that the railways should be operated without cost to the taxpayers.

Corporation Counsel Meier has replied to the request for an opinion as

to whether the city has any legal redress in the matter of the railway purchase. The outstanding point in the opinion is the declaration that if the city of Seattle paid a price for the railway grossly in excess of its real value, the city can maintain a suit against the Puget Sound Traction, Light & Power Company, based upon allegation of fraud, either for revision of the contract or to recover the damages sustained.

J. J. Wettrick, formerly engineer of the municipal railway and removed from office when Mayor Caldwell eliminated a number of positions in the Department of Public Utilities, has started mandamus proceedings in Superior Court to compel the city to restore him to his position.

The hearing before the court on the constitutionality of the city's new jitney ordinance, regulating routes, schedules and fares, referred to elsewhere in these columns, was recently completed. Attorney for the jitney drivers asserted that the ordinance was created merely to "grab the income" of the jitneys, which had been disregarded before the deficit in railway income was brought to the attention of Mayor Caldwell and the Council. W. R. Crawford, representing the jitney men, alleged that the railway is inadequate to serve the public, and that the jitney drivers' union has received petitions from 20,000 citizens asking that the present jitney service be allowed to continue. He said the ordinance violates the fourteenth amendment as the property of the jitney drivers would be confiscated by the enforcement of the ordinance. Mr. Crawford also contended that the rules of the City Council were violated when the ordinance was passed.

Attorney Meagher, for the city, contended that the "licenses" of the jitneys are not permits to operate jitney buses, but merely authority to drive a car. Jitneys were on the streets only on sufferance by the city as jitney buses. The city had a right to discontinue that sufferance at any time.

## Pocket Veto May Kill Water-Power Bill

### National Measure Passed by Both Houses May Be Allowed by President to Die

Explanations that do not explain are the order in Washington with respect to the water power bill, which may become of no effect by the failure of the President to sign it before adjournment of Congress on June 5. The nearest to an official statement in the matter was made informally by Secretary Tumulty, who announced that Secretary John Barton Payne of the Interior Department was opposed to the measure and then later stated that the President had received this and other bills at too late a date to permit his final consideration and favorable action in view of a serious difference of opinion which had developed.

**T**HE water-power bill was passed by both houses and went to the President for signature the middle of the week ended June 5. On Thursday it was referred to the Secretaries of War, Interior and Agriculture, who by the terms of the bill would have been members of the proposed Federal Power Commission. All three Secretaries reported to the President on or before June 5. It is definitely known that the Secretaries of Agriculture and War reported favorably and recommended that the bill be signed.

Mr. Tumulty's statement, however, clearly implies that the Secretary of the Interior recommended against the bill. This fact is also borne out by the general belief that Secretary Payne is personally opposed to the measure. The nominal grounds upon which he is supposed to have recommended a veto are that such an act would tend to destroy the national parks. Considerable credence may be given to the story on the ground that Judge Payne has been, since 1911, president of the Board of South Park Commissioners of Chicago, and this activity is known to have received the greatest personal interest and attention of the President.

There is no question but that the bill is still objected to by several influences, for as late as the time of the conference report to the Senate, barely a week before passage, Senators Lenroot, King and Norris all took occasion to point out their objection to the proposed regulation. Two grounds for opposition were thus cited: First, that the proposal made the development of water power a dominating influence, even with the right on the part of the Federal Commission to interfere with navigation on important navigable streams; second, that the terms for continuing a license after the initial period were such as to give practically perpetual lease to the original licensee.

It is probably the opposition thus voiced which leads to the rumor in Washington, which, however, cannot be confirmed, that either Senator Lenroot or Senator King had some influence in causing the "pocket veto." In any event, great surprise is expressed at every turn that the President should have declined to sign a bill so well known as of great importance solely on the ground that possibly some measure of damage might be done to the national parks.

Two power projects have been suggested as the possible cause of Secretary Payne's objection. It had been proposed that a dam be placed near the Idaho state line just outside of the boundaries of Yellowstone Park in such a way that the storage of water would have been within the park territory. Another dam on the Yellowstone River, within the boundaries of the park, had also been proposed. It is quite possible that these two projects, among others, may have been the cause of the Secretary's feeling of opposition. He refused to make any statement in the matter to the press.

Through pressure of interests favoring the bill, effort was made to find legal status for signature by the President after the close of Congress. Distinction between the end of a congressional session and the end of a Congress, such as occurs on March 4 at noon each second year, became a fine point in the issue. Precedent for executive approval was found in the case of an act signed by President Lincoln under similar circumstances, which act has been confirmed by Supreme Court decision holding it to be proper and effective as completion of the law. Opportunity therefore seems to be afforded for President Wilson to act on the measure at any time within the ten-day period following the presentation of the bill to him, that is, on or before June 11.

#### A POSSIBLE WAY OUT

The water power matter was deemed of such great importance by the Republicans that Senator Lodge, in his keynote speech at the Republican convention, made reference to it. The platform committee of the convention has also been urged to incorporate a plank in the platform on the matter by the American Forestry Association.

Official Washington has also busied itself in the matter and not a stone was left unturned in the effort to locate some means whereby the completion of the legislation could be accomplished. It was even rumored that the Secretary of the Interior was to withdraw his objection to the bill, so that there might be no ground for the charge that the administration is hostile to it. In any event it was clear that the friends of the measure refuse to lose hope in the situation, both with respect to the political aspects and the actual accomplishment of the end sought.

On June 10 it was announced that President Wilson had received an informal ruling from the Attorney-General stating that the President has ten days after the close of Congress to sign all bills and resolutions sent to him. It was said, then, that a formal opinion to this effect was being prepared. It was further said that after the formal opinion was received, the President would take up the water power bill and several other measures for final action. Up to the time of going to press at noon on Friday the measure still remained unsigned.

## Seventy Cents in Pittsburgh

### Compromise Wage Betterment Arranged by Receivers—Increased Fare in Prospect

The threatened strike of motormen and conductors at Pittsburgh has been averted by the receivers of the Pittsburgh Railways agreeing to pay the men a maximum hourly wage of 70 cents. The men voted June 9 almost twelve to one to accept this compromise wage settlement. The acceptance of the proposition submitted by the receivers as their ultimatum forecasts an increase in fare from 7½ cents, or four metal checks for thirty cents, to 8½ cents, or three checks for 25 cents. The trainmen will receive 64, 68 and 70 cents an hour, instead of 49, 52 and 54 cents an hour. This is an increase of 30 per cent. The new scale dates back to May 1. The wage increase is about half that first demanded by the men.

A tentative agreement resulting in the final adjustment was reached on June 5 at a conference in Mayor E. V. Babcock's offices, participated in by the receivers, Mayor Babcock, their counsel, and W. B. Fitzgerald, international vice-president of the Amalgamated, and the wage committee representing the trainmen.

The conference was suggested as a final effort at adjustment by Mr. Fitzgerald, who arranged for it by wire from his headquarters in Detroit. An hour after the conference convened the tentative agreement was reached. The settlement was reached solely through the efforts of the receivers, Mr. Fitzgerald and the men's committee, without the aid of the Mayor and City Council.

Receivers Fagan, Tone and George are now busy conferring with the men on the final details of the wage contract as agreed upon. In a day or two they will take up the working conditions. These, it is believed, will be finally adjusted with little difficulty; but, even if the adjustment of the working conditions is long delayed, the questions involved are not serious enough to precipitate a strike.

Back in April the men began negotiations with the receivers on their demands for a 75 per cent wage increase, or 91 cents an hour, as a maximum hourly pay. The receivers, of their own volition, had granted all the employees a wage increase of 10 per cent. This, the men declared, did not satisfy them. They insisted upon 91 cents.

Conference after conference was held in the hope of adjusting the matter before May 1, the date of the expiration of the trainmen's contract with the company. The men voted to strike on May 1. At this juncture, the Mayor and Council projected themselves into the controversy and, upon the promise that they would get the trainmen "a substantial wage increase," persuaded them to postpone strike action.

The receivers, a day or two later, offered the men a maximum pay of 65 cents an hour. Mayor Babcock handed

out a statement immediately afterward in which he contended that he and Council had fulfilled their promise to the trainmen. The trainmen refused to accept this offer. The receivers then insisted that the question involved be submitted to arbitration, in accordance with the rules and regulations of the trainmen's international organization. This the trainmen refused to do. They reiterated their threat to strike without further delay. Finally, they were persuaded to submit to arbitration through the efforts of Vice-president Fitzgerald. Ignoring the action of the receivers in appointing S. E. Duff as the arbitrator to represent the company, the trainmen demanded that the Mayor and two City Councilmen constitute the board of arbitration.

Receiver Fagan declared that so far as the receivers were concerned "that would be arbitration without representation." The city of Pittsburgh took up Receiver Fagan's phrase, and there was so much public indignation over the proposal that the Mayor and Council finally told the men that they would not consider that it would be legal to act in the capacity of arbitrators under the circumstances.

The controversy now was just about where it started two months before. Mr. Fitzgerald demanded that the trainmen submit to arbitration. They were considering the naming of an arbitrator, when the receivers finally agreed to offer them 70 cents an hour, which they readily accepted.

Receivers Fagan, Tone and George will make a public announcement this week giving a thirty days' notice of the contemplated increase in fare.

## Ten-Cent Wage Advance Rejected

Members of the conference committee of the employees of the Connecticut Company, New Haven, Conn., have informed J. K. Punderford that the men on the system throughout the State have voted to reject the company's offer of a 10-cent increase in wages. There have been some indiscriminate rumors of a compromise reported as coming from the men, but the attitude of the company is that the last word has been said. L. S. Storrs, president of the company, is reported as follows:

I don't know what is meant by the employees when they talk compromise. For there is nothing to compromise unless the employees accept the company's offer. The company made an offer of a flat increase of 10 cents an hour and this is really a great deal more than the company can afford at this time. Ten cents an hour means a very great increase in the operating expense of the system and it is a question if even this increase is a safe move for the company. So how can there be any compromise? We have made a maximum offer and can do nothing further. Any greater increase is entirely out of the question.

An increase of 10 cents an hour would mean that new employees would receive 54 cents an hour and employees of five years or more would receive 60 cents. Operators of the one-man safety cars would receive 69 cents an hour for the first year with the maximum at 75 cents an hour thereafter.

## Boston Wages Increased

**Company Arbitrator Dissents from Pay Award—Sees Higher Fares Unless Riding Increases**

Seventy cents an hour to trainmen on the surface lines of the Boston (Mass.) Elevated Railway and 72 cents to rapid transit trainmen are the maximum allowed under the arbitration award just announced. The opinion is by James L. Doherty, neutral arbitrator. It is subscribed to in full by J. H. Vahey, representing the men. H. Ware Barnum for the company agreed to most of the statements of fact in the award, although he could not agree with some of the principles enunciated, nor the increase in pay.

### DETAILS OF WAGE AWARD

The employees, having agreed upon certain working conditions, submitted to arbitration to complete their relations for the period extending from May 1, 1920, to July 1, 1921, the following questions:

1. What rate of wages shall be given to all of the employees of the company who are members of the association?
2. What rate of wages shall be paid to all employees above described for work on Sundays and holidays?
3. Shall all of the employees above described, or any of them, be given one day off in seven, with pay?

The wages awarded to men in the train service in cents per hour are as follows:

Surface lines, motormen and conductors	
First three months.....	58
Next nine months.....	64
Thereafter.....	70
Rapid transit lines, motormen	
First three months.....	65
Next nine months.....	66
Thereafter.....	72
Rapid transit lines, guards	
First three months.....	62
Next nine months.....	63
Thereafter.....	65
Rapid transit lines, brakemen	
First three months.....	55
Next nine months.....	58
Thereafter.....	62

Allowing extra compensation for Sunday work does not appear feasible. The reasons lie in the nature of the service requiring work to be performed on Sundays as on week days and without extra compensation to the company. It was pointed out that the volume of business done by the company on Sundays was materially less than on week days.

In dealing with the question of one day off in seven the board was of the opinion that practical considerations did not allow the establishment of such a regulation at this time.

### MAXIMUM EIGHTY-FOUR CENTS

Other rates of wages were established, some in excess of the maximum indicated and running as high as 84 cents an hour, higher wages being for workmen in the maintenance department.

The neutral member of the board was of the opinion that under all the circumstances the members of the association should have an increase in wages. He was not of the opinion, however, that the increase should even approximate the outside claims laid down by the men. Practical consid-

erations arising from the conditions of the company which are of vital interest to the men themselves precluded, in his opinion, a great increase.

Mr. Doherty said that the board could not assent, without modification of the proposition, that the condition of an employing corporation was not to weigh in determining the amount of wages which should be paid to employees. He said that above a certain required level of wages, which must be paid in any event, weight should be given to the financial situation in which the company found itself, and that this situation should largely determine whether wages should be advanced to meet reasonable requirements on a more liberal basis. In this case at this time the interests of the employing company and the men, so the board held, have much in common and the financial situation of the company was entitled to some weight in settling the advance to be made.

Mr. Barnum for the company saw no evidence of hardship or privation or of an existence inconsistent with self-respect or decency at the present time under present wages. He said:

It is my firm and honest conviction that the men under fair conditions average to make more per year than the great bulk of car riders. During the last year out of 5,000 motormen and conductors only 253 voluntarily left the service.

This increase in pay must result either in higher fares or restricted and impaired service, unless there should be a remarkable increase in riding or relief appear from some source not now in sight. The financial straits of the past years have forced the exercise of every economy. These burdens cannot go on forever increasing. I must dissent from the award so far as it grants increases in pay.

The wages which have been in force were established by an award made in July, 1919. This provided for payment of from 47 to 62 cents an hour to the "blue uniformed men," so called, on both the surface and rapid transit lines, being the active body of the organization and the men who man and operate the cars.

### Wage Vote in Chicago on June 14

Union employees of the Chicago Surface Lines will vote on June 14 on an offer made by the company of 15 cents an hour increase in the wage scale. The offer, if accepted, will mean a wage scale of 75, 78 and 80 cents an hour.

This proposition was presented after several weeks of negotiations. The discussions were prolonged because of the union's insistence on a six-hour Sunday with time and a half for overtime. The company took a positive stand that there would be no change from the present arrangement of "straight time" on Sundays with time and a half for work after eight hours. Chicago has had a wage 5 cents higher than any other city for some time and the men would not consider anything less than an 80-cent maximum.

The Surface Lines' offer is contingent on securing from the Public Utilities Commission a rate of fare sufficiently high to take care of the agreed wage. Hearings in the fare case have just closed and final arguments are to be

made on June 17. A decision is expected before July 1. Various figures as to the value of the properties have been submitted, ranging from \$100,000,000 to \$200,000,000.

### Strike in Peoria Settled

Cars are again running in Peoria, Ill., after a strike of the 320 employees of the Peoria Railway, which has continued two weeks. The men have voted to accept a report by their wage scale committee providing for a scale of 53, 56 and 59 cents an hour. The company then agreed to pay this scale unconditionally and the operation of the cars was resumed. The maximum scale had been 47 cents an hour previous to the strike. The street car fare is 6 cents. While admitting the justice of the demands of the men for a higher wage, the company asserted that it could not pay an increase unless the fare was increased. The company offered an increased wage on the condition that the Public Utilities Commission would allow an increased fare. This agreement was rejected by the men. The company is now preparing a petition to the commission for a higher fare. Officials of the company have said that the increase to the conductors and motormen and the shop men will amount to about \$150,000 annually.

### Enjoins Denver Wage Cut

Upon application by Mayor Bailey of Denver, Col., a temporary restraining order was issued by the Federal District Court on May 29, prohibiting the Denver Tramway for a period of five days from putting into effect the announced wage reduction and the local branch of the Amalgamated Association from calling a strike. Hearing on a motion to make the injunction permanent was set for June 2. The company had planned to reduce wages from 58 cents to 48 cents an hour on June 1, as a result of the action of the City Council on May 10 in referring to popular vote at the next regular municipal election in May, 1921, the 7-cent fare ordinance initiated by the company.

One Councilman presented an ordinance on May 17 which has for its object the repeal of the present 6-cent fare ordinance and the restoration of the 5-cent fare. Another Councilman introduced, on May 24, a measure which provided for municipal ownership.

F. W. Hild, general manager of the tramway, has distributed to the citizens a twenty-page pamphlet entitled the *Tramway*, as a special issue of the company publication, *Tram-o-Grams*. In this pamphlet references are made to the reports and recommendations of the various national, state, municipal and civic bodies which have investigated and studied the Denver traction problem and all of which, without exception, have substantiated the statements of the company in supporting a higher fare.

The court hearing went over from June 2 to June 10. Meanwhile the restraining order continued in effect.



# News Notes

**Wages Will Be Arbitrated.**—It is reported that agreement has been reached between the Asheville Power & Light Company, Asheville, N. C., and its trainmen on all points of difference except the matter of wages. That question will be disposed of by arbitration.

**Toronto Wage Representatives Named.**—The street railway employees' union has appointed John T. Vick as its representative and the Toronto (Ont.) Railway has named William H. Moore to act for it. The third arbitrator will be named by the Minister of Labor.

**London (Ont.) Men Secure Increase.**—Wages of motormen and conductors of the London (Ont.) Street Railway have been increased 8 cents an hour all around. Under the new scale they will be as follows: First year, 47 cents; second year, 50 cents; after second year 54 cents.

**Five-Cent Advance in St. Joseph.**—Trainmen of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., have voted to accept an increase in wages of 5 cents an hour. This is about one-third the sum they asked. The increase dates from June 1 for a period of six months.

**Storm Plays Havoc with Electric Lines.**—The recent storms in Middle Tennessee caused the heaviest disturbance of the past twelve months to local electric service. The distribution lines of the Nashville Railway & Light Company probably suffered more than those of any other wire using company.

**Chamber Against Department of Public Works.**—A proposal that the Chamber of Commerce of the United States advocate the establishment of a government Department of Public Works failed to carry in a referendum of the membership of the chamber, the result of which was announced on June 7.

**Linemen Get Increase.**—Negotiations which have been in progress between the Northern Ohio Traction & Light Company, Akron, Ohio, and the linemen in its employ have been satisfactorily terminated. The men have voted to accept the agreement providing for an increase of 17½ cents an hour. The proposition raising the pay from 70 cents an hour to 87½ cents an hour was made by the company and proved satisfactory to a majority of the men.

**Trainmen at New Orleans Want More.**—Motormen and conductors of the New Orleans Railway & Light Company, New Orleans, La., and other workers including pitmen, car repairers, carpenters and car cleaners will pre-

sent a new wage demand to the company. It is understood by officials of the company that the motormen and conductors will ask 75 cents an hour. The maximum pay for motormen and conductors now is 42 cents an hour.

**New Wage Scale in Hamilton.**—The wage award made by the board of conciliation at Hamilton, Ont., has been signed by the local union of the employees of the Hamilton Street Railway. The new scale fixed by the board provided 38 cents for the first six months, 40 cents for the second six months, 45 cents for the second year and 52 cents for the third year. The car-house men receive increases ranging from 6 to 9 cents an hour, and a reduction from 60 to 55 hours per working week.

**Four-Cent Wage Advance.**—The Roanoke Railway & Electric Company, Roanoke, Va., on June 1 advanced the wages of its trainmen 4 cents an hour. For the first year's service the pay is 44 cents an hour, for the second year it is 47 cents an hour, for the third year 48 cents an hour, for the fourth year 49 cents an hour, and for the fifth year and thereafter 50 cents an hour. For work on cars on the Salem-Vinton Division the company will pay 2 cents an hour in addition to the schedule just noted.

**Wants Utility Value Preserved.**—Corporation Counsel H. W. Byers of Des Moines, Ia., has answered Dr. J. Edward Kirbyem on the local railway matter. The doctor made a plea for a sliding scale of fares. With this plan Mr. Byers disagrees. He seeks a permanent solution of the problems of the Des Moines City Railway. To this end he favors the remission of paving charges, special taxes and other burdens. His contention is that the utility value of the railway is seriously impaired when fares are advanced.

**Trainmen Will Arbitrate.**—The union trainmen of the Eastern Massachusetts Street Railway, Boston, Mass., have voted to place in arbitration their demands for a change in wage schedule calling for a maximum rate of 75 cents an hour, an eight-hour day and time and one-half for overtime with Sundays and holidays and one day in fifteen off. The committee appointed to arbitrate the demands is comprised of James H. Vahey, representing the men; Attorney Philip Carleton of the Eastern Massachusetts Street Railway, and Hugh Ogden, Boston.

**Arbitration Not Compulsory.**—City Attorney Harry Hartman of Trenton, N. J., has informed the striking employees of the New Jersey & Pennsylvania Traction Company, Trenton, that the City Commission cannot compel arbitration of the differences between the company and men and only has the power to appoint a fifth arbitrator in case four others are appointed. The city attorney informed the men that they had forfeited their right to arbitration by going on strike and that by reason of this action they ceased to be employees of the railway.

**May Abandon Demand for Short Day.**—At the first meeting of the special committee to readjust schedules on the Cleveland (Ohio) Railway, in accordance with the recent agreement, it became evident that the men are more interested in getting straight, long runs than in the length of the workday and it is probable they will abandon the demand of the eight-hour day. At the suggestion of A. R. Dittrick, chairman of the committee, the members have been allowed two weeks to study the present schedules in Street Railway Commissioner Fielder Sanders' office.

## Programs of Meetings

### New England Street Railway Club

Plans for the trip of the New England Street Railway Club to Montreal on June 29-30 are now so far advanced that some outline can be made of them.

Invitations to join the club on the trip have been extended to and accepted by a governor and four lieutenant-governors of New England States and by the president of the Senate in another state, who will represent his Governor.

The party will leave Boston June 28, at 7 p.m. standard time by the Boston & Maine Railroad, and will arrive in Montreal the following morning. On Tuesday the party will be entertained on a sightseeing trip by the Montreal Tramways Company and in the evening there will be a banquet at the Windsor Hotel to which prominent provincial and city officials have also been invited as guests. No special program has been arranged for Wednesday. The party will arrive in Boston on the morning of July 1.

### New York Electric Railway Association

Plans are being completed for one of the largest and most enthusiastic meetings of the New York Electric Railway Association to be held at Hotel Champlain, Bluff Point, on June 26. Many delegates have signified their intention to be present and for the convenience of the Metropolitan members, there will be attached to train No. 7, leaving Grand Central Station, New York, on June 25 at 7.10 p.m. standard time two or three private sleepers which will go through to Bluff Point. The rates between New York and Bluff Point are as follows:

1 Transportation:	
Single trip .....	\$ 9.94
Round trip .....	18.91
2 Sleeper:	
Upper .....	2.00
Lower .....	2.50
Section .....	4.50
Stateroom .....	7.00
Drawing Room .....	9.00

Those who plan to attend the meeting are urged to forward checks drawn to the order of J. R. Ellicott, Jr., 165 Broadway, N. Y., who will complete reservations and deliver tickets in due course. The allotment of space will be on the basis of first come, first served.

# Financial and Corporate

## Akron Value \$7,604,478

City Lines of Northern Ohio System Held to Be Worth This on 1919 Price Basis

The M. E. Cooley valuation of the Akron (Ohio) city lines of the Northern Ohio Traction & Light Company was reported on by H. C. Anderson, University of Michigan, on June 1. This valuation was made in connection with the efforts of the company to secure a service-at-cost franchise.

The valuation inquiry was begun in December, 1919, and the figures were compiled on the reproduction cost new theory with two bases of prices. One value was made on the average prices of materials and labor over a period of the five years from 1914 to 1919, and another on the prices prevailing in 1919 alone. On the five-year basis the value was reported to be \$6,192,657. On the 1919 price basis it was placed at \$7,604,478.

These figures do not include any investment in power houses, sub-stations or terminal building, the assumption being made that these parts of the plant were a part of the property as a whole and that the Akron city lines would derive the necessary power as though purchased from the larger corporate body.

Another set of figures on the same two bases was submitted to cover the property within the Akron 5-cent zone. This embraces some mileage outside the Akron city limits over which the city service for the single fare is given. These values were set as \$6,530,086 and \$7,974,516.

An interesting point made by Mr. Anderson was that his estimates, which were based on a complete inventory of the property, did not take into account the decreased production efficiency of labor. This he placed at at least 25 per cent. In other words, he said one should really compute the labor cost of reproducing the property at 125 per cent of the labor cost in 1914, say, taking into account 100 per cent increase in wages and 25 per cent decrease in production.

## Abandonment Case Not Decided

Decision was reserved by Justice Wheeler in Supreme Court at Buffalo, N. Y., on June 3, on the application of George S. Bullock, receiver of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., for permission to abandon its traction lines between Buffalo and the Pennsylvania-New York State line. Maulsby Kimball, of counsel for the Buffalo & Lackawanna Traction Company, which owns the right-of-way between Buffalo and Lackawanna, informed the court that if the Buffalo & Lake Erie is scrapped, the Buffalo &

Lackawanna likewise would have to be abandoned. The Buffalo & Lackawanna right-of-way is operated by the Buffalo & Lake Erie Traction Company.

Towns and villages along the lake shore traction line entered vigorous protest against the application of the bondholders of the company. Thomas C. Burke, representing numerous property owners along the line, asked the court to direct the receiver to operate the road as long as the revenue meets operating expenses. He argued that if the line must be let go by the bondholders it should be offered for sale in parcels. It was argued that certain divisions of the road paid.

Among those who appeared in opposition was Henry W. Killeen of counsel for the International Railway, Buffalo.

## Segregation Plea Made

Rhode Island is about to pay the penalty for its inaction at the recent session of the Legislature. Only partial relief having been extended to the Rhode Island Company the officers have deemed it in the best interest of the property to cut off the non-paying lines. In consequence the receivers of the company have filed in the Superior Court a petition asking for authority to turn over to the owners the properties of the Providence & Danielson Railway and the Sea View Railroad on the ground that they are run at a loss. The opinion is expressed that the discontinuance of the lines will save \$110,000 a year.

The leases of the properties of the two lines ran for a period of 999 years from June 30, 1911. The results of operating the Providence & Danielson line since the receivership began, Jan. 31, 1919, show a yearly loss of about \$47,000, the receivers say, and the Sea View annual deficit is approximately \$16,000, exclusive of taxation and replacement expenses.

The fare was increased 20 per cent Sept. 28, 1919, and yet the showing for a period of six months indicates that the earnings for a year from July 1, 1920, will show a sum approximately \$68,000 less than the operating expenses for the Danielson line and \$25,000 less for the Sea View line.

When a reorganization plan, provisional upon jitney regulation, was settled upon by the holders of the securities underlying the Rhode Island Company, it was announced that discontinuance of some of the non-paying lines would be asked because of the failure of the General Assembly to pass a bill permitting towns to contribute to cost of service of such lines.

The court fixed on June 9 as the date for a hearing on the petition.

## \$4,798,136 in Claims

Receiver of Shore Line Electric Railway Reports to Court—Plant Estate Principal Creditor

A total of \$4,798,136 in claims against the Shore Line Electric Railway, Norwich, Conn., is shown in a report filed with the clerk of the Superior Court by Receiver Robert W. Perkins. The claims are summarized as \$658,016 in common, \$131,149 in preferred, \$3,472,400 subordinated to general creditors and \$541,570 disallowed.

In his statement the receiver detailed \$266,856 in approved common claims, \$131,149 in approved preferred claims and \$115,910 in preferred claims recommended to be disallowed in part as common. There was \$16,594 in preferred claims recommended to be allowed as common. Claims made by the executors of the Morton F. Plant estate are shown at \$253,426, partly allowed as common claims, and also \$3,472,400 which are subordinated to the general creditors and partly disallowed. There is a total of \$40,828 in common claims disallowed.

The claims allowed as preferred claims comprise \$126,962, due the State of Connecticut for taxes, \$981 in taxes due the town of Hopkinton, \$1,145 in taxes due State of Rhode Island, \$1,922 due town of Westerly for taxes and \$138 due the Westerly water department.

Executors of the estate of Morton F. Plant, by whom the road was controlled, filed as common claims several demand notes for \$231,000 with interest to Oct. 1, 1919, amounting to \$22,426, which the receiver recommends be allowed in the total sum of \$253,426 as common claims. Another claim by the executors is for \$3,472,000, which the receiver would allow as subordinate to the claims of general creditors, as provided in the text of the debentures. The Plant estate claim of \$477,455, interest on debentures to Oct. 1, 1919, is disallowed as the terms fixed in the text of the debentures provide for the payment of interest only when and as earned.

A deficit of \$78,506 in operating expenses for the six months to March 31 is shown by the receiver in his statement filed for that period with the court. The statement is as follows:

CASH RECEIPTS,	
Taken over at time of appointment	6,141
Receipts in October	80,036
Receipts in November	72,839
Receipts in December	86,888
Receipts in January	87,472
Receipts in February	49,859
Receipts in March	73,203
<b>Total</b>	<b>\$ 456,438</b>
Cash disbursements.	
Salaries and wages	\$ 238,994
Employee's compensation liability	1,649
Injury and damage	7,219
Material and supplies	103,240
Freight and express	1,025
Taxes, federal	1,343
Rent of tracks and terminals	2,020
Groton & Ston. St. Ry. bond interest	11,875
Interest trust company fee	29
Cash on hand, April 1, 1920	29,044
<b>Total</b>	<b>\$ 456,438</b>

## Increased Fares Increase Revenue

Earnings, However, Are Still Below Normal — Operating Ratio Has Climbed Steadily

Tables compiled from reports made to the American Electric Railway Association during the last six years reflect sharply the trend of conditions affecting the industry during that period. For convenience the income statements of 111 electric railways for the year 1917 to 1919, inclusive, have been summarized in Table I, while in Table II the income statements of 132 companies for the years 1918 and 1919 have been summarized, and in Table III the income statements of twenty-three companies for the year 1914 to 1919, inclusive, have been summarized.

IT WILL be noted that the trend of operating conditions during the period covered by the war and the period since the signing of the armistice are reflected in the tables. Incidentally, the tables also reflect some of the difficulties which beset the association when

Probably the most striking feature of Table I is the fluctuation of the net income. When considered in connection with the net incomes shown in Tables II and III it shows more clearly, perhaps, than anything else could the relative position of the electric railway in-

1919 was an unusually good year and that prosperity has returned to the electric railways. But when the net income for 1919 is compared with that in 1917, \$13,436,970, it becomes plain that electric railway earnings are still a long way below normal, and this fact is made still more apparent when reference is made to Table III, and it is seen that the year 1917 itself is far below the normal for pre-war conditions. The returns for twenty-three companies given in Table III show a net income of \$3,733,537 in 1917 as compared with a net income of \$10,855,721 in the same companies in 1914. When all the facts are presented in this way the truth stands out strongly that the electric railways have merely turned the corner of adversity and that they still have a long way to go before they get back to pre-war prosperity.

TABLE I—COMBINED INCOME STATEMENT OF 111 ELECTRIC RAILWAYS FOR THE CALENDAR YEARS 1917, 1918 AND 1919

These data were taken from the confidential reports sent by the operating companies to the American Electric Railway Association. The reports of interurban and city railways were used.

	1917	1918	1919	Per Cent Increase 1918 Over 1917	Per Cent Increase 1919 Over 1918	Per Cent Increase 1919 Over 1917
Railway operating revenue	\$191,569,500	\$200,812,016	\$241,059,002	4.82	20.04	25.83
Railway operating expenses	128,067,674	149,063,112	181,576,971	16.39	21.81	41.78
Net operating revenue	63,501,826	51,748,904	59,482,031	*18.51	14.95	*6.33
Net revenue from auxiliary operation	6,162,176	8,664,638	12,228,371	40.60	41.13	98.44
Taxes	12,605,681	13,672,681	15,461,941	8.46	13.09	22.66
Operating income	57,058,321	46,740,861	56,248,461	*18.08	20.34	*14.42
Non-operating income	4,068,513	5,123,576	4,471,204	25.94	*12.73	9.91
Gross income	61,126,834	51,864,437	60,719,665	*15.15	17.07	*0.67
Deduction from gross income	47,689,864	49,420,127	52,729,202	3.63	6.70	10.57
Net income	13,436,970	2,444,310	7,990,463	.....	.....	.....
Ratio: Net income to operating revenue (per cent)	7.02	1.2	3.3	*5.82	2.1	*3.72
Operating ratio, per cent	66.85	74.23	75.32	.....	.....	.....
Total car-mileage operating	696,076,362	607,212,434	615,571,409	*12.77	1.38	*11.57
Total passengers carried	3,901,233,364	4,173,375,377	4,374,485,429	6.98	4.82	12.13
Total miles single track	12,140	12,722	12,742	.....	.....	.....

\* Indicates decrease.

it tries to obtain statistics covering any extended period of time. As the number of years increased the number of companies whose reports are available falls off. Thus of the more than 200 companies which have reported to the association at one time or another only twenty-three have reported without a break for the last six years. This is especially to be regretted at this time, since the past six years cover the period of the war and statistics showing the course and development of the depression resulting from the war have a special interest. Table III gives the statistics of twenty-three companies for the whole period and they reflect very clearly the effects of the war, but because of the small number of companies included no general conclusions applying to the whole industry can fairly be drawn from them.

### NET INCOME FLUCTUATED VIOLENTLY

The 111 companies included in Table I operated 12,700 miles of tracks or about 30 per cent of the total mileage in the United States. City and interurban companies, large companies and small companies operating in every section of the country are included. The table therefore may be taken as fairly representative of all electric railways.

industry as a paying business to what it was formerly. It also demonstrates the greater value of statistics extending over a period of years than the same statistics for a shorter period.

Table I shows the net income of the 111 companies in 1917 as \$13,436,970. In 1918 this figure had dropped to \$2,444,310 and in 1919 it had risen

### FARE INCREASES REFLECTED IN STATISTICS

The ratio of the net income to the operating revenue in Table I indicates that in 1917 the companies' share of the revenues, that is, the amount remaining after the payment of all expenses and charges, amounted to 7.02 per cent. In 1918, out of a gross income of \$214,600,230, there remained as profits to the companies only \$2,444,310, which amounts to 1.2 per cent of the operating revenue of \$200,812,016. In 1919 an improvement was shown and the companies' profits amounted to 3.3 per cent of the operating revenue. It should not be forgotten, however, that this net income included the net revenue from auxiliary operations and non-operating income. If these were deducted in 1918 and 1919 there should have been deficits in both years in place of the net incomes actually shown. All of which indicates that the revenue from operation, the revenue from fares, is not yet sufficient to cover the expenses of operation, taxes and fixed charges. In other words, the business of transporting passengers is unable to pay its own way by itself.

The trend of operating revenues, as

TABLE II—SUMMARIZED STATEMENT OF 132 ELECTRIC RAILWAYS FOR THE CALENDAR YEARS 1919 AND 1918

	1919	1918	Increase 1919-1918 Per Cent
Railway operating revenue	\$281,839,834	\$234,736,440	20.06
Railway operating expenses	212,563,067	174,376,391	21.90
Net operating revenue	69,276,767	60,360,049	14.77
Net revenue: Auxiliary operations	10,082,985	6,996,268	44.81
Taxes	17,629,871	15,356,345	14.81
Operating income	61,729,881	51,999,972	18.71
Non-operating income	5,017,087	5,626,006	*9.22
Gross income	66,836,968	57,625,978	15.98
Deductions from gross income	58,787,454	55,315,229	6.27
Net income (or loss)	8,049,514	2,310,749	.....
Ratio: Net income to operating revenue (per cent)	2.86	0.98	1.88
Operating ratio (per cent)	75.42	74.29	.....
Car-miles operated—total	711,052,214	699,511,740	1.65

NOTE.—Companies doing a combined railway and power business are not included in this tabulation.

\* Decrease.

again to \$7,990,463. The increase of 1919 over 1918 is substantial and when the two years are compared by themselves, as they are for instance in Table II, the comparison is apt to be misleading. A casual study of Table II leaves one with the impression that

shown in Table I, reflects principally the effects of fare increases granted during 1918 and 1919. The increase of 1918 over 1917 is only 4.82 per cent while the increase of 1919 over 1918 is 20.04 per cent, and the increase of 1919 over 1917 is 25.83 per cent. That the

increase in revenues was due more to fare increases than to increased business is shown by the number of passengers carried. The increase in passengers in 1918 over 1917 was 6.98 per cent, and the increase of 1919 over 1918 was 4.82 per cent, while the total increase from 1917 to 1919 was 12.13 per cent, less than half of the amount of increase in revenues for the same year.

In spite of fare increases, however, the revenues failed to keep pace with the rising costs of operation. In 1918, while the revenues were increasing 4.82 per cent, expenses increased 16.39 per cent; in 1919, when revenues took the extraordinary jump of 20.04 per cent, expenses still went them a little better and increased 21.81 per cent; and over the two-year period the revenues and expenses increased 25.83 and 41.78 per cent respectively.

years, especially when one considers the character of the period covered.

That the increase was not greater is probably due to the difficulty which electric railways experienced in obtaining new capital except on most unfavorable terms, which caused most managers to operate with extreme economy and postpone renewals and improvements to the last moment possible.

In Table II summarized income statements of 132 companies for the years 1918 and 1919 are compared. The companies include the 111 companies shown in Table I and twenty-one additional companies for which the 1917 figures are not available. It will be noted that the additional companies do not change in any way the conclusions drawn from Table I, but on the contrary confirm them throughout and lend added strength of increased numbers.

and traffic on electric railways became normal, or perhaps one should say abnormal in the case of these twenty-three companies, since it reached a figure which has not been duplicated by them in any subsequent year to date. It was the last good year these companies had. From then on the rising costs of operation cut further and further into the net, two million men were sent abroad, several million more were confined in training camps, and traffic fell off. The worst was reached in 1918, and in 1919, after the signing of the armistice, traffic began to pick up, and the revenues, augmented by fare increases, managed with the aid of auxiliary operations to cover all expenses and charges and produce a small increase in the net income of the companies. This it is hoped the year 1920 will see continued.

TABLE III—COMBINED INCOME STATEMENT OF TWENTY-THREE ELECTRIC RAILWAYS FOR THE CALENDAR YEARS 1914, 1915, 1916, 1917, 1918 AND 1919

These data were taken from the confidential reports sent by the operating companies to the American Electric Railway Association. The reports of interurban and city railways were used. In 1916 the report forms were changed by the A. E. R. A. This change caused many companies to reclassify the items in their operating report.

	1914	1915	1916	1917	1918	1919
Railway operating revenue.....	\$55,319,348	\$51,860,660	\$54,873,572	\$56,613,758	\$60,603,738	\$70,161,810
Railway operating expenses.....	23,705,291	33,757,592	35,668,636	39,526,931	44,408,299	52,365,563
Net operating revenue.....	21,614,057	18,103,068	19,204,936	17,086,827	16,195,439	17,796,247
Net revenue auxiliary operating.....	975,675	929,959	1,340,642	884,171	1,008,422	882,067
Taxes.....	3,220,239	3,292,396	3,515,277	3,867,321	3,975,472	4,700,649
Operating income.....	19,369,493	15,740,631	17,030,290	14,103,677	13,228,389	13,977,665
Non-operating income.....				1,129,274	635,091	891,178
Gross income.....	19,369,493	15,740,631	17,030,290	15,232,951	13,863,480	14,868,843
Deduction.....	8,513,772	8,838,051	7,699,077	11,499,414	11,259,947	11,855,935
Net income.....	10,855,721	6,902,580	9,331,213	3,733,537	2,603,533	3,012,908
Ratio: Net income to operating revenue, per cent.....	19.6	13.4	17.00	6.57	4.44	4.3
Operating ratio, per cent.....	60.51	65.09	65.00	69.82	73.28	74.64
Total car-mileage operating.....	185,152,868	176,493,770	187,927,368	184,517,992	185,531,328	187,115,963
Total passengers carried.....	1,355,173,303	1,293,427,803	1,455,162,847	1,369,926,196	1,341,105,452	1,435,495,004
Total miles single track.....	3,069	3,157	3,256	3,494	3,241	3,228

The story of the failure of the operating revenues to keep up with the increase in expenses is told in the figures for the operating ratio. In 1917 the ratio was 66.85 per cent; in 1918 it was 74.23; and in 1919 it was 75.32.

The figures for the taxes paid by these companies indicate that while having some difficulty in meeting their own expenses the electric railways continued nevertheless to contribute their full quota to the expenses of government. Their contributions to the public treasury in 1917 amounted to \$12,605,681; in 1918 to \$12,672,681, an increase of 8.46 per cent; and in 1919 to \$15,461,941, an increase over 1918 of 13.09 per cent. The increase of 1919 over 1917 amounted to 22.66 per cent. It should be remembered also that these companies probably made other contributions to the public treasury in the form of paving, sprinkling, snow removal, bridge tolls, etc., which if considered as taxes, as might not improperly be done, would show a greatly increased total.

The amount of fixed charges of these companies does not show any fluctuations which could be called startling or even unusual, which in itself, however, is remarkable when considered in connection with the trend of other items. Amounting to \$37,689,864 in 1917, they increased to \$52,729,202 in 1919, an increase of 10.57 per cent, not an extraordinary increase for two

The great increase in the net revenue shown in this table, while it should not, as stated above, be taken as an indication that prosperity is being visited upon the electric railways, nevertheless is a promising sign for the future. It would seem to indicate that the worst has been passed and that from now on a steady improvement may be looked for.

Table III is interesting principally from the fact that it covers the entire period of the war and the year subsequent to the armistice. An outstanding feature of the table is the slump which occurred in 1915. If the fluctuations of such a small group of companies can properly be traced to general causes this slump was probably a reaction to the outbreak of war. It will be remembered that thousands of nationals of the belligerent companies returned to Europe at that time; exports to Germany were cut off, and other nations stopped buying in many lines, with the result that American industry was affected; shops and factories shut down and thousands of people were thrown out of work; all of which events combined to cause a heavy loss of riding to the electric railways. This is clearly shown in the loss of 72,000,000 passengers in 1915 as compared with 1914.

By 1916 the development of the munitions industries had more than taken the place of the industries that had suspended; employment was general

### Valuation Measure Causes Astonishment

Delos F. Wilcox, chief expert for the New Jersey State League of Municipalities in the proceeding before the Board of Public Utilities Commissioners upon the application of the Public Service Railway for emergency relief, has raised his voice in protest against the intended valuation of the property of that company as provided for under the bill passed by the recent Legislature over the veto of Governor Edwards. His attitude is one of "profound astonishment." He says "the determination will be the determination of an engineering firm hired to perform a public function, without supervision, without responsibility, without public hearing and even without testimony."

Mr. Wilcox's protest is addressed to William T. Read, State Treasurer, and Newton A. K. Bugbee, State Comptroller, who under the valuation bill become members of the valuation commission. In the course of his statement Mr. Wilcox says:

It is almost unbelievable that a Legislature representing the people of a great and enlightened State like New Jersey should have put upon the statute books such an outrageous measure. I am not a constitutional lawyer, but if there is anywhere tucked away in the articles of either the Federal Constitution or the State Constitution of New Jersey any guaranty of protection for the public in the valuation of public utilities and the fixing of public utility rates, I feel sure that this act runs contrary to that guaranty.

## Tax Valuations Unchanged

Property valuations for 1920 as announced by the Indiana State Board of Tax Commissioners show that no radical changes were made in the 1919 valuations of public utilities. The total valuation of the street and interurban electric railways of Indiana was fixed by the board at \$69,966,109. The 1919 valuation of the companies was \$69,987,249. The assessments of large companies remain practically at the figure fixed in 1919.

Property valuation of the Indianapolis Street Railway was fixed at \$16,355,570. This is \$2,240 more than the combined 1919 assessment of the company, the Indianapolis Traction & Terminal Company and subsidiary companies, which were consolidated under orders of the Public Service Commission within the last year. Other properties of the company which are assessed locally will bring the total valuation of the company to about \$19,000,000.

Samuel Ashby, corporation counsel of Indianapolis, had recommended that the tax assessment of the Indianapolis Street Railway be reduced to \$15,000,000, but the tax board ignored this suggestion. His idea was to make the tax conform to the plan which the city had submitted to the Public Service Commission for putting the company on a service-at-cost basis. It was pointed out at the conference that it was inconsistent for the company to have one valuation for tax purposes and another for rate-making purposes. The company contends that its valuation under the service-at-cost plan should be equal to that placed upon the property by the tax board.

Valuation figures for all the electric railways of the State for 1919 and 1920 follow:

	1920	1919
Main track .....	\$56,675,670	\$56,353,060
Second main track..	3,057,750	3,522,660
Side track .....	584,845	557,155
Rolling stock .....	6,567,544	6,370,534
Improvements .....	3,080,300	3,183,840
Totals .....	\$69,966,109	\$69,987,249

## \$75,000 Will Buy Equity in Michigan Road

The Adrian (Mich.) Street Railway has been offered for sale by the Toledo Railways & Light Company, which has control of the lines. The price asked is \$75,000, plus the assumption of the bonded indebtedness and obligations.

The officials of the railway declare that the city lines in Adrian have failed to pay operating expenses and that unless some new arrangement is made for their operation suspension is imminent.

It is understood that the Chamber of Commerce at Adrian is investigating the possibility of organization of a city company or providing for municipal operation of the property.

The road at Adrian was taken over when the Toledo & Western Railroad was brought under the control of Henry L. Doherty & Company, New York, N. Y.

## Financial News Notes

**\$278,000 in Equipment Trust Notes.**—Equipment trust notes in the amount of \$278,000 will be issued by the Georgia Railway & Power Company, Atlanta, Ga., in part payment for twenty-seven new cars to be used on its urban, suburban and interurban lines. The State Railroad Commission has approved the company's request for authority to issue these notes. The total cost of the cars is \$381,000.

**Protest Against Discontinuance.**—Protest against the abandonment of the Saugus Division of the Eastern Massachusetts Street Railway has been filed by the town of Saugus, Mass. The trustees of the road have announced the discontinuance of service on this line owing to the failure of the road to meet running expenses. The loss on the Melrose line for the previous year was \$21,000 and for the line between Saugus Centre and Linden, \$27,000.

**Date Set for Hearing Cleveland Dividend Appeal.**—June 15 has been set as the tentative date for hearing the appeal from Common Pleas Judge David H. Thomas's decision refusing to enjoin a referendum on the Cleveland Railway's increase in dividend from 6 to 7 per cent. Judge William Middleton of Waverly will act in place of Judge Washburn on the Appellate Court bench, as the latter is trustee for the stockholders of the Cleveland Railway and asked to be excused.

**Payment of Interest Authorized.**—Judge E. T. Sanford, in the federal court at Knoxville, Tenn., has handed down an order modifying the injunction in the case of the Commercial Trust Company and the Maryland Trust Company against the Chattanooga Railway & Light Company permitting the local company to pay interest in the amount of \$26,250 on a loan of \$750,000 secured by \$389,000 in bonds of the Lookout Mountain Railway and \$682,000 in bonds of the defendant company.

**Memphis Earns Surplus.**—The report of the receivers of the Memphis (Tenn.) Street Railway for the month of April shows that the net earnings of the company were equal to 7 per cent per annum, or one-half of 1 per cent more than was guaranteed by the city under the compromise agreement. The report shows that after setting aside the 3 per cent for the replacement reserve fund and 6½ per cent on the rate base, the investment on which the company is permitted to earn, the net profit for the month was approximately \$4,000.

**Houston Behind Under New Fare.**—The Houston (Tex.) Electric Company during the first month of operation un-

der the 7-cent fare has failed to earn its 4½ per cent for depreciation and 8 per cent income on its property value as fixed by the federal court. The net income of the company during the month lacked \$8,619 of reaching \$60,625 required to give the company its 4½ per cent for depreciation and 8 per cent on property value. The gross earnings of the Houston Electric Company during April were \$185,931, while operating expenses were \$122,300, and taxes were \$11,626.

**Key Route Would Issue \$124,279 in Notes.**—The San Francisco-Oakland Terminal Railways, Oakland, Cal., on June 1 applied to the Railroad Commission for authority to issue thirty-six notes, aggregating \$124,279, to the American Car Company, St. Louis, in payment for twenty-five double-end safety motor cars for use on its Alameda County system. The full price of the cars is given as \$161,060, the difference between this amount and the amount covered by the notes being the cash payment required by the car contract. The notes are to run over a period of three years, the date of maturity depending upon the time of the delivery of the cars.

**Hyde Park Bill Passed.**—The Hyde Park bill, by which the Boston (Mass.) Elevated Railway will operate over the lines of the Eastern Massachusetts Street Railway, has been signed by the Governor and approved by Mayor Peters. This bill provides that the Boston Elevated shall operate as a separate corporation on the Hyde Park lines and shall charge a fare not to exceed 10 cents. Deficits in operation are to be met by the city of Boston and expenses incurred for maintenance and construction are to be borne by the Eastern Massachusetts Street Railway and the city jointly. Such expenses are not to exceed \$100,000. The Boston Elevated Railway is to pay a rental of 6 per cent and will also pay 7 per cent of the expense of rehabilitation of the property.

**Deficit Diminished Slightly.**—The operating revenue of the Rhode Island Company, Providence, R. I., exceeded its operating expense by \$123,788 for the month of April. Other revenue made the total net income for the month \$126,298, an increase of \$11,995 over the same month a year ago. The increase in net income for the four months to April 30 was \$169,807. On the other hand, the increase in the operating expense caused a deficit of \$209,100 when compared with the income for the first four months of 1919. The statement shows a deficit for the month, after deducting rentals and fixed charges, amounting to \$48,275. If the fixed charges are taken into consideration the deficit of the company as of April 30 was \$536,500. The passenger earnings for the month were \$633,743, an increase of \$105,279. The receipts per car-mile were 53.87 cents, an increase of 7.54 cents. The receipts per car per day were \$85.48, an increase of \$12.46.

# Traffic and Transportation

## Higher Return Authorized

Virginia Municipalities, in Granting Fare Increase, Allow 8 Per Cent Return on New Capital

The Common Councils of Newport News, Hampton and Phoebus, Va., have authorized and the Virginia Corporation Commission has ratified an increase in the fare charged by the Newport News & Hampton Railway, Gas & Electric Company, Newport News, from 5 cents to 7 cents and in the rate for gas from \$1 to \$1.10. In approving the new scale the local authorities announced that, if the higher rates proved insufficient, the company would be free to apply for a further increase.

### FACED LARGE DEFICIT

The Newport News authorities not only took into account the necessity for higher rates to meet existing conditions, but they went a step further and recognized the principle of adequate return on capital. The rate increase has been adjusted to a 6 per cent allowance on property investment prior to 1920 and to 8 per cent on capital that may be invested in the property during the two years in which the new rates are to be effective.

The company found itself this spring facing a deficit of \$76,000. It required \$250,000 for capital expenditures to maintain adequate service. With the ending of the war, there was a heavy decrease in patronage, particularly of the traction lines, and it was chiefly from the reduced earnings of these lines that the company faced a deficit. Net earnings from the gas plant were also on a declining scale. On the other hand, the profits from electric light and power sales showed a substantial increase.

These facts were frankly stated to the Common Councils of the three municipalities by the management. A full statement of earnings was presented, also costs of operation and materials, and the actual figures of capitalization and appraised values. The company having presented these facts asked the municipal authorities for relief, but specifically requested that such relief as was granted be granted as the local authorities thought best. No effort was made to indicate a policy or to dictate a plan. The only suggestion made by the management was that the cost of new capital probably would be about 8 per cent and that therefore such rates as might be increased should have a relation to the cost of capital.

### COUNCILS' LIBERAL STAND

In meeting the situation, the local authorities showed much more than the average intelligence of such bodies and

were inspired by the sentiment of fairness. They did not at any time enter any objection to the main premise of the company, that it should have a larger revenue. Their argument was entirely as to which of the different facilities should contribute most to make up the amount involved.

In the hearings that took place, there was some controversy between local representatives of labor and citizens on the question of labor tickets. At no time was there any serious objection to the principle of higher return on capital invested.

## Seattle Increase Imminent

Seven-cent fares have become a definite possibility for the Seattle (Wash.) Municipal Railway. An ordinance has been introduced in the City Council of that city providing for the increase in fare and for a 1-cent transfer charge. The proposed ordinance took the form of an amendment to the existing city ordinance, which provides for the present 5-cent fare, with certain transfer privileges.

Only one member of the City Council is unalterably opposed to any increase in fare. The majority of the Council, however, express the belief that the fare should not be raised above 6 cents, with the 1-cent additional charge made up by taxation. Mayor Caldwell favors a 6-cent fare, contending that it is only fair that the taxpayers should help support the railway system, since it is a general asset to the city.

Tables prepared by David W. Henderson, Superintendent of Transportation, indicate that the proposed 7-cent fare would mean an increase in annual revenue of \$2,124,371 the figures being based on a compilation of the receipts from cash fares during the last year. The added revenue on a charge for transfers, figuring that 60 per cent of the transfers would be demanded on lines other than the two cable lines excepted in the proposed bill, would be \$156,166. Mr. Henderson states that the railway faces a deficit of \$400,000 and is operating at a daily loss of \$3,000.

As a result of an ordinance recently passed by the City Council, requiring that each bus driver file an application for permit, jitneys were ruled off the streets of Seattle for four days. Through court orders, the jitney men have been allowed to return to their runs, pending a hearing on their applications and specifications of their routes. The ordinance provides that no jitneys may operate on streets served by electric cars, and that each jitney driver must make application for permit, specifying routes, schedules, and other data.

## Eight-Cent Fare Essential

Head of Railway at Portland Regards This as One Way Out—Commission Reconsiders Appeal

The Public Service Commission of Oregon is again taking up the matter of relief to the Portland Railway, Light & Power Company in considering an application of the company for permission to increase its rates. The application was filed by the company when the three measures designed to furnish financial relief to the company were defeated at a recent election. The hearing is confined to verification of allegations in the new application, and no testimony will be taken dating back of the commission's order of last March.

In the application for increase of rates, the company points out that in the tabulations, statements and estimates of operating expenses and revenues submitted at the time of the previous investigation of the corporation's financial condition, it was estimated that revenues from operation of street railways during the year 1920 would be equal to the revenues for the year 1919 based upon a continuance of the present 6-cent fare, and "in accordance with the said estimate, the evidence before the Public Service Commission demonstrated that the loss in operation of the street railways of Portland on said basis would exceed \$1,000,000 a year."

### REVENUE DECLINING

A comparison of the revenue of the railways of Portland for the months of February, March and April of 1920, with corresponding months of 1919, is set out in the latest application of the corporation, as follows:

	1920	1919
February .....	\$337,835	\$358,271
March .....	337,108	397,028
April .....	375,845	382,921

The first twenty-four days of May, 1920, according to the application, showed a decrease in excess of \$5,000 below the revenues for the first twenty-four days of May, 1919.

The application points out that no relief has been secured through increased traffic. On the contrary, traffic has slightly decreased since the last hearing. All wage adjustments have been upward. Maintenance expenditures have been held to a minimum, the report states, and it is of vital importance to the continuity of service that there be an immediate considerable increase in expenditures for maintenance of the railway property.

One member of the commission has gone on record as favoring a 7-cent fare, with a 1-cent charge for transfers, while another member made his campaign on the platform that 6 cents was too much for a 5-cent ride. Franklin T. Griffith, president of the corporation, states:

The sword has long been over our heads. The voters, who defeated the relief measures bringing about the rehearing in the rate case, knew through figures developed at the last rate case hearing that the company was facing an annual deficit in excess of \$1,000,000. With the defeat of the relief measures prepared by the city, I personally can see nothing but an 8-cent fare to absorb the deficit.

## Mitten Plan Opposed

Reported Disagreement Within Company on Fare Question—Stotesbury Threatens to Resign

Many rumors have been current in Philadelphia, Pa., during the past ten days concerning an alleged breach between Thomas E. Mitten, president of the Philadelphia Rapid Transit Company, and E. T. Stotesbury, chairman of the board of directors. According to newspaper accounts the following situation exists: Mr. Stotesbury's support of the Mitten management may be withdrawn at any time. A difference of opinion over the question of fares is the cause of the dispute.

### STOTESBURY SAID TO OBJECT

Mr. Stotesbury strongly objects to the Mitten plan for extension of the 3-cent charge for exchange tickets. He is of the opinion that the \$3,000,000 which, it is estimated, would be raised under this plan would yield an insufficient return. He favors a flat increase in fare to 7 or even to 10 cents.

At the meeting of the board on June 2 Mr. Stotesbury submitted his resignation as chairman. This action was taken following the indorsement of the Mitten program by the directors. Mr. Stotesbury finally agreed to withdraw his resignation provided the question of accepting the Mitten plan were left in abeyance. To this the board agreed. Thereupon Mr. Stotesbury withdrew his resignation.

The board of directors has held several meetings at which the Mitten program has been discussed. It is said that the announcement of the plan came as a surprise to a number of the board members, including the city's representatives. The latter have expressed opposition to the scheme.

### BOARD FAILS TO ACT

The board failed to indorse the plan at its meeting on June 4. Instead, the matter was referred to the executive committee, which, after considerable discussion, announced that a board of experts would pass on the comparative merit of the Mitten and Stotesbury proposals. Both Mr. Mitten and Mr. Stotesbury have refused to discuss the reported differences of opinion. The following statement was issued by W. C. Dunbar, vice-president of the company, after the meeting on June 4:

Following the meeting of the directors of the Philadelphia Rapid Transit Company held this day, E. T. Stotesbury stated that the question of increased revenue required by the company was being given careful consideration by the executive committee, to which it had been again this day referred by the board of directors.

Mr. Stotesbury regrets the statements appearing in the press that he has had any difference of opinion with Mr. Mitten. The desire of both is to use their best efforts in the interest of the public and the property.

A request for a report and recommendations from the city's directors on the P. R. T. board regarding the proposed change of fares was made in a resolution adopted by the City Council on June 8. Another resolution approved by the chamber authorized the Mayor and the city solicitor to intervene in

behalf of the city in petitions pending before the Public Service Commission for a reduction of rentals paid by the Philadelphia Rapid Transit Company to its underlying companies and for improvements of service by the transit company, or to file new petitions for the same purpose.

## Court Fight on Buses

Public Service Railway Asks Injunctions to Halt Jitney Competition—Thirty-six Complaints Filed

Declaring the operation of jitney buses in competition with its lines to be illegal, the Public Service Railway of New Jersey on June 3 filed in the Chancery Court at Trenton thirty-six bills of complaint against as many jitney operators in different cities of the State. The bills ask that injunctions be issued against the jitney men on the ground that the operation of the buses is illegal and improper and that they also are a nuisance. Included in the action are Newark, Jersey City, Bayonne, Hoboken, West Hoboken, Orange, East Orange, Camden and other municipalities.

It is alleged in the complaints that the jitneys are a hindrance to the railway's obligations and that the damages resulting to the complainants are immeasurable in extent and irreparable in character. As a result adequate relief can be obtained only in a court of equity, the bills say. Temporary restraining orders are not sought as being of uncertain usefulness.

### UNFAIR COMPETITION ALLEGED

Reciting the legislative authority under which the company was organized, the complainant sets forth in the bills that it operates 900 miles of street railways in 142 municipalities and interurban lines in eleven counties. The papers show that the railway pays annually more than \$12,000,000 in wages to its employees and additional millions in interest, taxes and other charges. This includes a 5 per cent tax on the gross receipts of the company for the exercise of its franchise, and charges of a like character.

It is set forth that the business of the company represents an investment of more than \$150,000,000, upon which it is not earning a fair return because, it is alleged, of the operation and interference of the defendants and other bus operators. The company also charges that the buses impede the progress of the surface cars by running on the car tracks.

Thomas N. McCarter, president of the Public Service Railway, issued the following statement after the filing of the complaints:

We have filed these bills in chancery against certain operators of jitney buses as a matter of protecting our rights. We have refrained from acting earlier only because we thought that the business would be properly regulated, but when the Legislature failed to enact a measure putting the jitneys under the same kind of regulation and control as the street railways are subjected to we felt that it was time to have the matter thoroughly tested out.

## Six Cents in Detroit

Temporary Rate Arranged Before Court Pending Comprehensive Audit of Company's Books

The Detroit (Mich.) United Railway and the city of Detroit after conferring in the Circuit Court for two days on the subject of fares agreed upon a 6-cent fare with nine tickets for 50 cents as a temporary rate. Universal transfers will be issued. The new rate went into effect at midnight on June 8. All persons paying cash fares or buying tickets are to receive receipts entitling the holders to a refund if a thorough examination of the company's records show the proposed additional fare is not justified. A test case will probably be instituted later to prove whether the Circuit Court has the right to fix fares in the case.

### PERMANENT RATE ASKED

In arguing the fare question the disputants stood apart for some time on two points. The railway insisted that Judge Jayne set a permanent fare after an audit of the company's books, this audit being one of the conditions imposed by the city. In objecting to this, Mayor Couzens maintained that the court had no legal right to set the rate of fare and he did not desire to make the present conference a rate making case. The city held out for a court order to which both parties would agree.

Failure to reach an agreement would have resulted in Judge Jayne taking up the city's petition for an injunction against the abolition of transfers by the Detroit United Railway. This injunction if granted probably would have resulted in the railway instituting its own schedule of fares based on the unexpired franchises.

### CITY DEMANDS AUDIT

The Mayor stated that evidence that the accounts of the company need a very careful audit was shown in the first ten minutes of the conference when the company admitted having charged to upkeep of its roadbed and cars \$685,000 more than it had spent. This the company stated had been put into increasing interurban investments and extensions in the city of Detroit. Thus the Mayor claimed it was charging up to the car riders of the city large amounts of money which it would not spend to improve the equipment and service in Detroit. Another charge branded as unjust was \$90,000 for the appraisal which the company submitted some time ago to the Public Utilities Commission to enable it to issue more bonds.

No agreement was reached concerning the audit of the company's books, but the possibility of taking up the audit started by the city's accountants last year was discussed. The purpose of the audit by the city would be to determine whether the company needed the additional fare revenue to meet the increased wages it has granted the platform men.

## Transportation News Notes

**Higher Fares in Johnstown.**—Cash fares were raised from 6 cents to 7 cents in Johnstown, Pa., on June 1. The State Public Service Commission, in permitting the increase, directed the Johnstown Traction Company to report to the commission each month on its traffic revenues and expenses for a period of one year under the new rate of fare. Four tickets are sold for 25 cents.

**Forecasts Milwaukee Increase.**—Intimation that fares in Milwaukee, Wis., might be raised in the near future was given recently by the Wisconsin Railroad Commission when it announced a public hearing in Milwaukee for June 11. Representatives of the city and of the Milwaukee Electric Railway & Light Company were asked to appear before the commission on this occasion. The present rate is 7 cents cash or nine tickets for 50 cents.

**Will Act on Dallas Plea.**—The City Commission of Dallas, Texas, will take action on the application of the Dallas Railway for an increase in fares from 5 cents to 6 cents and a 1-cent transfer charge as soon as the question of the authority of the commission to increase fares under the terms of the franchise is settled. The commission has asked attorneys for the company for a brief in support of the company's contention that the commission has authority to increase fares. A majority of the members of the commission have acknowledged the justice of the request of the company.

**Injunction Halts Fare Cut.**—As a result of the granting of an injunction by Judge House, the Tri-City Railway, Davenport, Iowa, is still charging 7-cent fares on its lines in Davenport. Judge House acted upon a petition of twenty-two Davenport retail merchants, who asked that the City Council be restrained from enforcing the terms of an ordinance which provided that the fare revert to 5 cents on June 1, and that the company be restrained from ceasing operation. The company is continuing to pay its employees a wage scale of 60 cents an hour. The permanent wage question will be settled by an arbitration board.

**Interurban Road Wants More.**—The Massachusetts Northeastern Street Railway, Haverhill, Mass., has asked the State Department of Public Utilities for authority to increase the fares over the system 38.8 per cent. The company proposes to charge 8½ cents each for workingmen's tickets, instead of the 6 cents now charged. The flat fare of 10 cents will remain unchanged. Operating expenses and fixed charges

will amount to \$1,097,000 for the year, and the new rate of fare will produce only sufficient revenue to meet expenses and take care of depreciation, but will not enable the company to pay dividends.

**Wants Ban on Jitneys.**—The Springfield (Mass.) Street Railway has petitioned the State Department of Public Utilities asking alteration, amendment or revoking of regulations governing jitneys in Springfield, Chicopee, Palmer and Spencer. It asks that no licenses be granted to operate jitneys on the same streets and routes as the street railway, and that jitneys be required to maintain adequate and regular service day and night, as required of street railways, to continue throughout the year. It further asks that children be carried on jitneys at half the regular fare, and that licenses be bonded at \$1,000, with no licenses granted for less than one year.

**Nine Cents in Youngstown.**—An increase in fare from 8 to 9 cents became effective in Youngstown, Ohio, on June 1. The fare advance was opposed by the City Street Railway Commissioner on the ground that the resumption of full operation in the iron and steel mills would provide sufficient funds at the former rate to build up to stabilizing fund, which is now below the required amount. The City Council has been notified by the Youngstown Municipal Railway that it is appealing to arbitration the question of operating and maintenance allowances. Col. Joseph Alexander of the Cleveland Railway has been selected by the company to act as its representative. The city will select a second arbitrator, these two to choose a third.

**Wants Six Cents in Richmond.**—The Virginia Railway & Power Company, Richmond, Va., on May 26 applied to the City Commission of Richmond for permission to charge 6-cent fares on its Richmond lines. The company asked the abolition of labor tickets and the continuation of school tickets at the present rate. With the application to the commission was submitted a proposed ordinance embodying the rate changes and revocable on thirty days' notice. The employees of the company were promised an increase in wages as soon as the city had granted the higher fares. In the application it was stated that notwithstanding suspension of dividends the company has already voluntarily increased wages. However, it can make no further increase in wages without a further increase in revenue. The income which would be realized by this 6-cent fare is estimated at \$125,000. The proposed increase to employees amounts to \$133,000 a year.

**Seven-Cent Fare Approved.**—An ordinance was passed by the City Commission of Grand Rapids, Mich., on May 24, under the terms of which the Grand Rapids Railway is authorized to raise its fare from 6 cents to 7 cents beginning June 24. By the terms of the measure the company is required to sell sixteen tickets for \$1 and to reroute

its lines. The commission reserves the right to revoke the measure at any time, if service is not improved. The law contains a provision that whatever money the company receives on the increased rates which is in excess of the 5-cent fare stipulated by the company's franchise and not necessary to meet operating expenses, fixed charges and a reasonable depreciation shall be treated as a loan from the city and shall not be considered as a basis of return by any franchise hereafter granted. The company's franchise expires in April, 1922.

**Fares Raised to Avert Strike.**—The City Commission of Kalamazoo, Mich., on May 30 passed a resolution permitting the Michigan Railway to charge a 10-cent fare, sell three tickets for a quarter and carry children between the ages of five and twelve years for 5 cents. The measure was an emergency one, being the alternative to a suspension of service which threatened to take place on June 1 unless the employees were assured the wage advance allowed recently by the board of arbitration. The new rates will prevail until the primary election in August, when a contract between the city and the company will be submitted to the electors, and if it should not carry the 10-cent fare as now permitted will continue until Dec. 31 next, unless any of the other cities served by the Michigan Railway should be given a lower rate, in which case the fare will be reduced accordingly. The proposed contract to be submitted in August will probably provide for a 10-cent fare and the installation of one-man cars on the Kalamazoo lines. The City Commission of Jackson on May 28 authorized the company to collect 10-cent fares on its Jackson lines. Other municipalities served by the system have taken similar action.

**Expect Rochester Rise Soon.**—A 7-cent fare on the Rochester lines of the New York State Railways will become effective on July 1, unless present plans miscarry, according to an announcement made by Corporation Counsel Charles L. Pierce. Drafting of the new agreement between the city and the New York State Railways has progressed far enough to make the fare increase a virtual certainty, although the agreement will not be ready until June 22 to be presented to the Common Council. Appointment of a commissioner of transportation and provision for his assistants are yet to be made, but it is reported that the agreement will contain all those provisions. According to figures which the company submitted to the Public Service Commission for the Second District, practically one-third of the company's investment is in Rochester. A big factor in the negotiations is the value of the rolling stock, car-houses and other equipment used in the public service, as the proposed contract is to call for a fair return on this investment. It is said that the company values this property at \$17,000,000. The city considers this figure too high.



## Personal Mention

### Mr. Faber in New Field

**Aurora, Elgin & Chicago Manager Made Vice-President of Firm of Barron G. Collier, Inc.**

Edwin C. Faber, vice-president and general manager for the receiver of the Aurora, Elgin & Chicago Railroad, Aurora, Ill., has become associated with the advertising firm of Barron G. Collier, Inc., New York, N. Y., as vice-president. Mr. Faber will retain his present title with the A. E. & C. System and will continue to give some time to the company for an indefinite period, while E. F. Gould, as assistant general manager, will have charge of operation.

Although Mr. Faber expects eventually to sever his connections with the Aurora lines, he will, nevertheless,



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E. C. FABER

keep in close touch with the electric railway industry. The Collier Company has a national reputation in the field of electric railway advertising, and Mr. Faber's long experience as a traction manager and his wide acquaintance with electric railway men makes his addition to the organization an asset of the greatest value.

The announcement that Mr. Faber ultimately would sever his connection with the A. E. & C. System evoked expressions of regret from every member of the company's personnel, including not only Mr. Choate, the receiver of the company, and the other officials, but also the trainmen. The Aurora and Elgin newspapers also expressed regret at Mr. Faber's leaving. The Elgin *Courier* said editorially:

For a good many years now Mr. Faber has been administering a hard job so efficiently that those who had an understanding of the sum of his difficulties were continually wondering just how he kept things going.

But he did keep the road going and the men satisfied and managed to retain the good-will of the communities that were served. The employees are his friends and even in wage controversies they remained

his friends, for he has a way of inspiring confidence and respect.

When the traction company was thrown into a receiver's hands, the receiver asked Mr. Faber to retain the managership, and he has justified the confidence of that office by his wholehearted efforts to place the business on a paying basis.

Mr. Faber was born in 1875. At the age of twenty-six years he became general superintendent of the Cleveland (Ohio) traction system. For many years he bore the distinction of being the youngest general superintendent of an important city electric railway in the United States. When the Cleveland property changed hands in 1902, Mr. Faber became associated with Ira A. McCormack, general manager of the Grand Central Terminal, in connection with the electrification of the New York Central lines entering New York. Upon the completion of the work Mr. Faber served for a time as assistant to Hinsdale Parsons, vice-president of the General Electric Company.

In 1904 Mr. Faber became general manager of the Aurora, Elgin & Chicago Railroad, and vice-president of the Elgin, Aurora & Southern Traction Company. A year later these two properties were consolidated with the Cook County & Southern Traction Company, and Mr. Faber became general manager of the combined properties. In 1913 he was made vice-president.

Early in the war Mr. Faber went to Washington, D. C., as traffic manager of the Traffic Bureau of the Electric Railway War Board of the American Electric Railway Association. Later he was appointed manager of the War Board. In both offices he was of great assistance to the electric railways of the country, particularly the interurbans, and through him their work was articulated in the national service. He thus performed work of invaluable service to the industry and to the public.

### J. P. Barnes Heads Louisville Railway

James P. Barnes, general manager of the Schenectady (N. Y.) Railway, has been elected president of the Louisville (Ky.) Railway. Mr. Barnes succeeds Thomas J. Minary, who retired as president last February after thirty years' service as active head of the Louisville system. Since Mr. Minary's resignation the management of the property has been in the hands of a committee composed of three directors.

Samuel Riddle, superintendent of transportation of the Louisville system, has been made a vice-president of the company.

Frank H. Miller has also been elected a vice-president of the Louisville Company. Mr. Miller has been serving as superintendent of motive power.

### A. Hardgrave, President

**Former Traction Trainman Elected to Head Southwestern Electrical & Gas Association**

A. Hardgrave, Dallas, Tex., recently elected president of the Southwestern Electrical & Gas Association at its annual convention in Galveston, has had a varied experience in traction and public utility work. Mr. Hardgrave was born in Texas in 1881. He began his career as a trainman on the Fort Worth-Dallas interurban soon after the road was built. Later he became train dispatcher, and in 1906 was appointed chief inspector for the Oak Cliff division. After serving in this position for a few months, he was transferred back to Fort Worth as chief inspector for the city division. Prompted by a desire to learn the construction and engineering end of the traction business, he resigned in 1907 to go to Memphis, Tenn., where he worked for two years with Stone & Webster.

In February, 1913, Mr. Hardgrave entered the employ of Martin J. Insull,



A. HARDGRAVE

Chicago, Ill., for whom he made engineering and valuation reports in connection with the acquisition of utility properties.

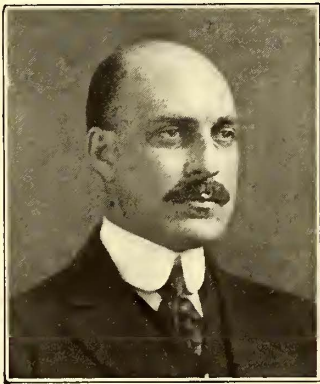
In March, 1916, with the promotion of Martin L. Olds, who had been assistant to Mr. Insull, and his transfer to the Twin State Utilities Company of Vermont, Mr. Hardgrave became engineer of operation and construction of the Mid-West Utilities Company, with headquarters in Chicago. He held this position until August, 1917. During this time Mr. Hardgrave had charge of the operation and construction of properties in the Middle West.

In August, 1917, he was transferred to Dallas. At that time the Mid-West Utilities Company decided to divide its territory and centralize control of operation and construction in branch offices. Dallas was made headquarters for the States of Texas, Oklahoma and Missouri, and Mr. Hardgrave was sent to Dallas to open the office. At the same time he was made vice-president of all the subsidiary companies of the American Public Service Company.

## R. R. Potter Joins Tubes

Superintendent of Equipment of Hudson & Manhattan Railroad — His Varied Traction Career

R. R. Potter, superintendent of equipment of the New York, Westchester & Boston Railway, New York, N. Y., has resigned to accept a similar position with the Hudson & Manhattan Railroad, which operates the tubes under the Hudson River between New York and New Jersey. Mr. Potter entered railway work in connection with the electrification of the Manhattan elevated lines, supervising the installation of car equipment and later doing inspection and maintenance work. Later he served in a similar capacity on the Interborough Rapid Transit subway lines and still later with the Long Island Railroad in connection with the initial electrification of that system. He then served for a time with the Hudson & Manhattan Railroad during the equipping of that company's lines and the first period of its operation.



R. R. POTTER

Mr. Potter later became connected with the firm of L. B. Stillwell, for which he supervised the installation of the initial equipment of the New York, Westchester & Boston Railway. Upon the completion of the line, he was appointed superintendent of equipment, continuing in that capacity until receiving his new appointment. During the past year he has also served as superintendent of equipment of the Westchester Street Railroad and the New York & Stamford Railway.

Mr. Potter has been instrumental in remedying a number of weaknesses in the single-phase equipment of the New York, Westchester & Boston System. He has also furnished much data for articles on operating performance and costs which have been published in this paper from time to time.

## Akron Changes Announced

The following changes have been made in the operating personnel of the Northern Ohio Traction & Light Company, Akron, Ohio:

D. A. Scanlon, formerly general superintendent of transportation, has been promoted to the position of general superintendent of railways, succeeding B. E. Parker who has resigned on account of ill health.

Harry Steele, formerly superintendent of the Akron, Bedford & Cleveland and the Akron, Kent & Ravenna divisions, has been made acting general superintendent of transportation.

J. S. Lowe, formerly assistant superintendent of these divisions, has been made acting superintendent of the divisions.

Pierre V. C. See has been appointed superintendent of equipment, as previously announced.

Mr. Scanlon began his railway work in the shops of the Portland (Me.) Railway Company. In 1903 he went to Ohio for the Tucker-Anthony Syndicate as foreman of shops of the Newark street railway. He later went to Raleigh, N. C., as superintendent of the Raleigh Electric Company. In 1909 he was transferred to Canton, Ohio, as superintendent of the Akron-Canton interurban line and the Canton City System. He remained there until last year, when he was transferred to Akron as general superintendent of transportation of the N. O. T. & L. lines.

Mr. See was formerly superintendent of car equipment of the Hudson & Manhattan Railroad, Jersey City, N. J., this connection dating back to 1910. He was born in 1879 in New Brunswick, N. J. In 1904 he was graduated from the electrical engineering department of the Armour Institute, Chicago, and shortly thereafter began his work in the electric railway field with the Metropolitan West Side Elevated Railway, Chicago, serving for three years as foreman and car building inspector in the Throop Street shops. He then became general foreman in the shops of the Twin City Rapid Transit Company, Minneapolis, Minn., serving in this capacity for three years. He was then made general foreman in the Decatur shops of the Illinois Traction System and remained there for about one year, when he resigned to join the Hudson & Manhattan Railroad.

## Mr. Ahearn Promoted

James M. Ahearn, assistant superintendent and purchasing agent of the Ottawa (Ont.) Electric Railway, has been made assistant manager of the company. Mr. Ahearn will continue as purchasing agent also. He has been in the service of the Ottawa system for the past 19 years. He resigned in 1905 and worked for various electric railways in the western part of the United States and Canada until 1914, when he returned to Ottawa as assistant to the master mechanic. The following year he was appointed assistant superintendent in charge of shops. Two years later he became assistant superintendent of all departments. He was made purchasing agent of the system in May, 1919.

## Will Direct City Utilities

Carl H. Reeves Made Superintendent of Public Utilities of Seattle, Succeeding T. F. Murphine

Carl H. Reeves has been appointed Superintendent of Public Utilities of Seattle, Wash., by Mayor Hugh M. Caldwell of that city. Mr. Reeves succeeds Thomas M. Murphine, who resigned following the municipal elections several weeks ago. Since Mayor Caldwell took office the Public Utilities Department has been reorganized and in its place two departments have been formed. The Seattle Municipal Street Railway has been placed in charge of D. W. Henderson, as previously announced. As Superintendent of Public Utilities, Mr. Reeves will direct the electric lighting and other public service work of the city, but will have no connection with the electric railway department.

Mr. Reeves has for a number of years been engaged in engineering work in connection with the Seattle traction system and on construction of other



C. H. REEVES

city utilities. A resident of Seattle for the past twenty-seven years, he served in the office of the city engineer for a number of years prior to 1906, and while serving in that capacity designed a large part of the city's sewer system and other municipal projects. From 1906 to 1916 he was assistant engineer of the Seattle Electric Company, resigning to perform special work for the State Public Service Commission, after which he took up private engineering practice.

Mr. Reeves was the first engineer officer called from Seattle at the beginning of the war to active duty assignment in the Engineers Corps. He directed engineering work at Camp Fremont, California, at Puget Sound forts, at Camp A. A. Humphreys and at other camps throughout the country. After serving for twenty-three months he was honorably discharged as a Major, on June 4, 1919.

Seattle is one of the very few cities of any considerable size in the United States that operates both railway and lighting systems municipally.

W. H. McAloney, formerly superintendent of rolling stock of the Winnipeg (Man.) Electric Railway, is now associated with John A. Beeler, consulting engineer. Mr. McAloney resigned his connection with the Winnipeg system several weeks ago. Before going to Winnipeg he served as superintendent of rolling stock of the Denver (Col.) Tramway.

E. F. Gould, consulting engineer of the Aurora, Elgin & Chicago Railroad, Aurora, Ill., has been appointed assistant general manager of the company. Mr. Gould will have direct supervision of the operation of the system for the receiver. He has been connected with the company since 1903. Five years ago he resigned as assistant general manager to become consulting engineer for the properties in which Mandelbaum, Wolf & Lang are interested.

W. G. Claytor, electrical engineer of the Lynchburg Traction & Light Company, Lynchburg, Va., and the Roanoke Railway & Electric Company, Roanoke, Va., has been promoted to assistant to J. W. Hancock, general manager of the companies. Mr. Claytor has been in the service of the Roanoke and Lynchburg companies since January, 1907. He was commissioned a captain in the United States Army in 1918, and was assigned to the Construction Division, with headquarters at Brunswick, Ga.

Walter S. Finlay, Jr., who recently resigned as superintendent of motive power of the Interborough Rapid Transit Company, New York City, to become vice-president of the American Water Works & Electric Company, was tendered a dinner by his former co-workers and others at the Delta Kappa Epsilon House in that city on June 9. A round hundred guests were present, including officials of the company, department heads, and representatives of other railways and of manufacturers. The speakers were Frank Hedley, president and general manager; H. H. Vreeland, vice-president; H. A. Kidder, Mr. Finlay's successor, and Mr. Finlay. G. C. Hall, electrical engineer, acted as toastmaster.

Edward J. Peartree, whose appointment as general manager of the Trenton & Mercer County Traction Corporation, Trenton, N. J., was noted in a previous issue, has been in the traction business for the past twenty-five years. Mr. Peartree was born in Troy, N. Y. In 1891 he entered the employ of the Troy & Lansingford Traction Company as an extra hand in the carhouse. He continued with the company when it became the Troy City Railway. Later the road was acquired by the United Traction Company, Albany, N. Y. Mr. Peartree was subsequently made a motorman and then a conductor. Mr. Peartree remained with the company until 1915, when he resigned to become traffic superintendent of the Trenton & Mercer County Traction Corporation. Two years later he was made superintendent of transportation. Following the death of Peter E. Hurley, general manager, two years ago,

he was made acting general manager and general superintendent.

Alfred C. Jordan, superintendent of equipment of the Cumberland County Power & Light Company, Portland, Me., has resigned to become superintendent of equipment of the Elmira (N. Y.) Water, Light & Railroad Company. In his new position Mr. Jordan will have charge of the railroad shops and overhead lines of the light and railroad departments of the Elmira system. Mr. Jordan returns to Elmira after an absence of four years. He was born in Casco, Me., in 1879. Graduating from the University of Maine in 1904, he entered the service of the Westinghouse Electric & Manufacturing Company at Pittsburgh, Pa., where he remained for seven years. He then became connected with the Elmira Water, Light & Railroad Company. Five years later he entered the service of the Cumberland County Power & Light Company, on the power end of the commercial department. He was later promoted to commercial manager and, still later, to superintendent of equipment.

Frank L. Hinman, master mechanic of the Trenton & Mercer County Traction Corporation, Trenton, N. J., has been appointed superintendent of surface shops of the Philadelphia (Pa.) Rapid Transit Company. Mr. Hinman has been connected with the electric railway industry for the past seventeen years. Before joining the Trenton & Mercer County Traction Corporation he was master mechanic of the New York State Railways, Syracuse Lines. Beginning as an apprentice with the Syracuse Rapid Transit Company, he was successively a general mechanical shop and power house assistant with the Auburn & Syracuse Electric Railway, and storeroom clerk, storekeeper, general mechanical foreman and finally master mechanic of the Rapid Transit Company and its successor, the New York State Railways, with headquarters at Syracuse. He has contributed a number of articles to the ELECTRIC RAILWAY JOURNAL and has also co-operated in the preparation of several other unsigned articles.

Charles F. Scott, professor of electrical engineering at Yale University, and L. P. Ferris of the engineering organization of the American Telephone & Telegraph Company and the Western Electric Company, sailed for Europe on Saturday, May 29, on the *Adriatic*. They are going as representatives of the Western Electric Company in connection with railway inductive interference problems in telephone and telegraph work under the peculiar conditions of the Italian State Railways. They expect to be in Europe from two to four months. Professor Scott is well known in this field, having made early studies in Indiana, and later on the New Haven and the Pennsylvania systems. Mr. Ferris has been active in the California inductive interference work in this line for the past five years. Announcement was made re-

cently that a further 60,000,000 lire had been appropriated for the purpose of electrifying the Italian railroads, making a total of more than 600,000,000 lire for this use since January. Five thousand kilometers will be operating electrically before the end of the year, the announcement said. One hundred million lire also was appropriated for construction of new railroads.

## Obituary

J. Lee Penn, vice-president of the Texas Electric Railway, Dallas, Tex., died on May 23 at Johns Hopkins Hospital, Baltimore, Md., where he had gone for treatment. Mr. Penn was widely known in business circles in Texas, having been engaged in business at Waxahachie, Tex., his home for many years. He also had extensive banking holdings and was interested in other enterprises.

James M. Edwards, at one time active in the management of the Detroit (Mich.) United Railway and the Yonkers (N. Y.) Railroad, died on May 24 at his home in New York City at the age of seventy years. For many years Mr. Edwards was associated with the late Richard T. Wilson, for whom he built the Yazoo & Mississippi Valley Railroad, between Memphis, Tenn., and New Orleans. He turned his attention to the building of street railways in 1894, and was active in the construction of the Yonkers system, serving as treasurer until the sale of the property to the Third Avenue Railway.

R. D. Sefton, general manager of the Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa., died on the night of May 22 as the result of injuries suffered earlier in the day in a rear-end collision on the company's mountain line, a few miles from Waynesboro. Mr. Sefton was acting as motorman of one of the cars involved in the wreck. The accident occurred at a curve just below a point known as Geiser Switch. A heavy car had derailed and a line crew under the direction of Mr. Sefton had gone to the scene to replace it. When the task was completed the car was started down the mountain fastened in front of the closed work car. A truck-car, loaded with tools, was fastened behind the two others. The three cars, controlled by the power of the middle car, started down the mountain behind another car carrying passengers. After rounding a curve the brakes of the three cars joined together failed to work. The cars soon were out of control and gained speed rapidly. Overtaking the car loaded with passengers the runaways crashed into it, and the four were carried for a distance of about 200 feet when the first car derailed and the other cars piled up. Ten other persons were injured.

# Manufactures and the Markets

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

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

## Curtailment Seen in Waste Supply

**Partial Shutdown of Cotton and Woolen Mills Is Limiting the Amount of Available Material**

Demand for cotton and woolen waste continues to be strong in spite of the fact that railroads are curtailing expenditures for the summer months. The supply is reported to be short, the few dealers who have a large stock of waste on hand having contracted for their supply several months ago. Dealers say that the scarcity is due to the decreased production of the textile mills, a number of both the cotton and woolen goods factories in New England having been forced to limit operation to four, and in some cases even three, days a week. This is felt to be a result of the credit situation and the general reduction in clothing prices which has recently taken place throughout the country. Consequently, the price of cotton waste advanced about two cents a pound within the last six weeks and woolen waste jumped a cent a pound during the past month.

Colored cotton waste is quoted at 9 to 16 cents a pound, while white cotton waste holds slightly higher at 12½ to 18 cents per pound. Woolen waste is bringing from 16 to 25 cents.

Shipments are very uncertain from New England mills. One representative dealer expects the production of waste to pick up as soon as the freight situation is relieved, but any tendency toward a resultant decrease in waste prices will be more than counterbalanced, he thinks, by the poor outlook for this year's cotton crop. The government's monthly crop report issued for June places the present cotton crop at only 62.4 per cent of normal.

## Good Demand in Wood Pole Accessory Market

**Stocks of Poles, Cross-Arms and Pins at Mills Cannot Be Moved—Prices Hold Steady**

The chief problem regarding wood poles, pins and cross-arms seems to be the difficulty of obtaining shipments from the mills. One of the largest dealers in this line says he has received no cedar poles for three months. Pins are impossible to obtain, he says, and there are no stocks in the hands of dealers. Select fir cross-arms can be shipped in two weeks, but deliveries are subject to the railroads and average for all these materials from six to nine weeks. The situation is expected to clear up soon, as large surplus stocks

have piled up at the mills and a plentiful supply will be available in about a month, it is thought. Chestnut poles can be obtained in two or three weeks, but the demand and supply of these is largely a local matter.

The demand for poles, pins and cross-arms is fairly strong, heavier than in the corresponding period a year ago, but not so vigorous as earlier this year, since the railroads have curtailed expenditures for the summer months.

Prices have held steady in the past few weeks. Standard locust electric light pins are quoted at \$34.70 per 1,000 in lots up to 5,000. Prices for the 30-ft., 7-in. top red cedar poles are quoted at \$21.95 f.o.b. New York City, \$20.40 at Chicago and \$22.10 at New Orleans. Forty-foot lengths, 7-in. tops, are quoted at \$22.95 f.o.b. New York City, \$21.40 for delivery at Chicago and \$23.10 in New Orleans.

## Active Demand for Safety Cars

**Deliveries Good Considering Transportation Difficulties—Embargoes on Fittings Cause Trouble**

Inquiries for safety cars are increasing and shipments are now promised by one leading manufacturer in the East on the basis of three to four months' delivery. Railways hitherto showing no interest in this class of equipment are seeking quotations. It is interesting in this connection to note that the use of one-man cars on the larger city systems is growing. Their success in handling traffic on the more congested routes of medium-sized cities has awakened the managers of not a few really large properties to the possibilities of such cars on their lighter traffic lines.

Competition is acute for business among safety car makers, and in some parts of the country complaint is heard about price cutting. The railway companies are naturally the beneficiaries of this competition, so far as immediate purchases are concerned, but among some manufacturers it is felt that in the long run a broader distribution of orders would be helpful to the industry.

Embargoes upon safety car fittings, especially on air brake parts, are causing at least one manufacturer trouble in completing orders now on the books for 300 units. Labor is not as efficient as formerly and wage tendencies are still upward. However, no further price advance is forecast at present, and if the operating companies continue to come into the market, their requirements can be met reasonably well for some time to come.

## Cement Stocks Pile Up at the Mills

**Dealers Have No Supplies for Construction Work or Railway Repair Use**

Present difficulties in obtaining supplies of cement are caused by the shortage of cars rather than by decreased production, according to one prominent manufacturer. Raw material has been coming through fairly well except for some trouble with coal. Although weeks behind on filling orders, a large surplus supply of cement has piled up at the mills, sufficient to fill orders from stock were transportation normal. Another company refuses to quote on deliveries and will accept no new orders, as it is from five to six weeks behind at present. This is in the face of a demand which is stronger now than at any time in recent years. The inability to fill the construction demand of course reflects on supplies for railway use.

Reports agree that there are virtually no stocks of cement in the hands of dealers throughout the country. Orders have been placed mainly for construction work, which is essential, and so almost no cancellations have been noted.

Prices of cement, which took a drop after the armistice, increased on an average of 20 cents a barrel last April and May. Since then the market has held steady, a condition all the more surprising in view of the fact that about 70 per cent of the cars received by manufacturers are of the open, drop-bottom type and have to be floored and roofed with water-proof tarpaulins, thus adding to the cost of production.

## Supply of Line Hardware in Poor Condition

**Normal Stocks of Raw Materials at Steel Mills Cut by Strikes and Tie-Up**

Strikes at the steel mills are still largely responsible for the present shortage of line hardware. The freight tie-up has further handicapped steel works by curtailing their normal supplies of raw material. One dealer states that no shipments are coming in at present, and promises for future delivery range anywhere from six weeks to four months. Another company is still waiting for the fulfillment of orders given in November and December.

Existence in the field of line hardware is at present a hand-to-mouth affair, as stocks on hand are insufficient to meet current needs. This class of metal goods is particularly scarce be-

cause manufacturers are paid for such material as bolts, braces, washers, etc., on a pound basis, and there is less profit in proportion to the work concerned.

In spite of the fact that demand continues to be strong, the market has held steady since a price increase of 10 per cent about March 1. Quotations at present average approximately 6½ to 7 cents a pound.

## Demand for Aluminum Conductor Increasing

Stock of Raw Material Limited Because of Heavy Call in Non-Electrical Fields

Demand for aluminum conductors for high-tension transmission has been increasing at a good rate in the last few years. The market for this metal in non-electrical trades, however, is so large and is increasing at such a high rate that difficulty is being experienced in satisfying it. In the face of this, supply is reported as becoming rather limited.

Shipments for lengths to cover small distances, say 50 miles, are being quoted at from four to six months, while for several hundred miles the time is running up to ten months and a year. Congestion is experienced in the mills, more so in the fabricating than in the drawing processes, however. Present capacity is more than booked up, and on account of the limited stocks for electrical work orders are being refused.

While domestic demand is good, the foreign market is especially so. Large orders have recently been received for this conductor for European, Japanese and Australian properties, while inquiries, particularly from Italy, France and Scandinavian countries, have been heavy. This market has been opening up rather rapidly in view of existing installations in the States. If the material is available, a good future business is anticipated in the light of the prospect held out, when the water-power bill shall come up again next winter. While no retrenchment has been seen in the purchasing of this material by industrial power companies, reports indicate a recent holding back on the part of certain electric railway properties.

Ingot aluminum prices are strong, the market for 98-99 per cent material holding at 33 cents a pound.

## Trolley Shoe Market Expanding

Trolley shoes are in rapidly increasing demand and so far deliveries have been reasonably good, considering the difficulties of shipping raw material and finished products by rail. A feature of the market is the widely distributed demand, inquiries and orders coming in from many parts of the country and from overseas properties as well.

From six weeks to two months are being quoted at present on trolley shoe deliveries. Factory stocks have been practically wiped out by the demand. On May 1 an advance of about 10 per

cent was put into effect, but this was the first change in prices since September, 1918.

## Stocks of Insulation Materials in General Low

A recent survey of conditions throughout the country in the insulating material field reveals the fact that distributors' stocks are very low. Isolated instances occur where dealers are able to fill orders from stock, but this is usually the result of foresight in buying. There is no shortage of varnish, but manufacturers are hampered by a scarcity of cloth material, brought about by the partial shutdown of the textile mills.

Demand is strong, but has fallen off somewhat in the past two weeks. Buyers of insulation seem to be awaiting possible developments in respect to transportation, prices, etc.

Deliveries vary according to the class of insulation, but average double those of normal times. Fiber material is quoted at about six weeks, webbing two months; and varnished cloth runs from two to four weeks. The tendency of prices has been upward, though for the past two months the market has held steady. No cancellations of orders have been noted.

## New Brake Construction Developed

The Ackley Brake & Supply Corporation, New York, N. Y., announces the new construction of its Ackley "No-Staff" brake. Up to the present time malleable iron has been used in its construction, but, recognizing the importance of a lighter yet reliable brake, the company will in future construct its pedestals of pressed steel and the gears and other working parts of electric steel. By the use of these materials the weight of the brake has been reduced by more than 25 lb. and a considerable saving is made on platform space.

## Rolling Stock

**Benton Harbor**—St. Joseph Railway & Light Company, Benton Harbor, Mich., has purchased two double-truck cars with air brakes from the Cleveland Railway Company, Cleveland, Ohio.

**The London & Port Stanley Railway**, London, Ont., Canada, has been authorized by the private bills committee of the Provincial Legislature to purchase additional equipment through the city.

**The Board of Control of Toronto, Ont., Canada**, has recommended to the City Council that Works Commissioner Harris be given authority to purchase new street cars.

**Chambersburg, Greencastle & Waynesboro Street Railway**, Waynesboro, Pa.—The directors of the C., G. & W. Street Railway Company have authorized the purchase of a new steel car to replace one which was destroyed in a recent wreck.

**Interstate Public Service Company, Indianapolis, Ind.**, which controls the interurban line operating from Louisville to Indianapolis, through its president, Harry Reid, reports that the company is now having built eight 62-ft. all-steel cars by the Cincinnati Car Company. These cars will be motored with four 150 hp. General Electric motors and will have General Electric control. Mr. Reid stated that it was planned to use these heavily motored cars in pulling two to four car trains when traffic is heavy, doing away with the need of running from two to five sections, as is now frequently the case. The old cars are only of 50 to 55 hp. and not sufficiently powerful to reduce time on the runs. It is planned to reduce running time by about thirty minutes with the new cars. These new cars will be equipped with baggage and smoker compartments, as well as a large seating space. The total outlay for the eight cars will run close to \$200,000. Delivery has been delayed by strikes in the shops of the Cincinnati Car Company, but they are expected in a short time.

**St. Petersburg & Gulf Railway Company, St. Petersburg, Fla.**, has ordered eight safety cars from the National Safety Car & Equipment Company, St. Louis, Mo. The company already has six of these cars in use.

## Track and Roadway

**Southern Pacific Company, San Francisco, Cal.**—Deeds have been filed transferring to the Southern Pacific Company a right of way for an electric line from the Alameda County line through Richmond Annex into Richmond. It is reported that the company ultimately expects to extend the Ninth Street loop into Richmond.

**Connecticut Company, New Haven, Conn.**—The Connecticut Company will lay a second track 3,500 ft. long in Watertown Road, Waterbury. The company will also lay a single track curve at the intersection of Water Street and the viaduct, New Haven.

**Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.**—The Fort Wayne & Northern Indiana Traction Company proposes to build a new electric line in Franklin Avenue and Third Street, Fort Wayne. The work of laying the tracks will begin early in 1922.

**Trenton & Mercer County Traction Corporation, Trenton, N. J.**—The Trenton & Mercer County Traction Corporation will remove its rails from the side of Greenwood Avenue, Trenton, to the center of the street to allow the completion of a section of the Lincoln Highway. The tracks will be relaid for a distance of about a half mile.

**Memphis (Tenn.) Street Railway.**—The Memphis Street Railway will lay new rails on its Main Street line from Poplar Avenue to Union Avenue. The company will also lay new rails in

Calhoun Street between Main Street and Rayburn Boulevard.

**Dallas (Tex.) Railway.**—The Dallas Railway will begin work of laying track on the Masten Street line, which will be a cut off from McKinney Avenue into the retail business district at Elm and Ervay. It will be about four months before the work can be completed.

**Richmond, Houston & San Antonio Traction Company, Houston, Tex.**—Work of constructing the grade for the Houston, Richmond & San Antonio Traction Company's proposed interurban electric railway between Houston and San Antonio, 225 miles, will be resumed immediately. Much of the grading is done and all of the right of way obtained. H. A. Halverton, Houston, is president of the company.

**Manitowoc & Northern Traction Company, Manitowoc, Wis.**—The Manitowoc & Northern Traction Company has been ordered by the Manitowoc City Council to build spur tracks in Washington and North Eighth Streets.

### Power Houses, Shops and Buildings

**Havana Electric Railway, Light & Power Company, Havana, Cuba.**—The Havana Electric Railway, Light & Power Company plans to double the capacity of its power plant. The company has ordered from the Westinghouse Electric & Manufacturing Company two 25,000-kw. steam turbo-generators. At present there are in this plant three 12,500-kw. generators, supplying the combined railway and power load. The first unit will be installed and will be in operation in 1921 and the second one will be on the line in 1922.

**Boston (Mass.) Elevated Railway.**—Mayor Peters of Boston has approved a recommendation of the City Transit Department for alterations in the plans for the construction of the Arlington Street station of the Boylston Street Tunnel. The changes had previously been approved by the trustees of the Boston Elevated Railway. They are expected to add \$200,000 to the cost of the structure.

**Eastern Massachusetts Street Railway, Boston, Mass.**—The Eastern Massachusetts Street Railway has placed in operation its new power plant in Vincent Street, Boston. The power station in Washington Street has been closed.

**Brockton & Plymouth Street Railway, Plymouth, Mass.**—The steam generating plant of the Brockton & Plymouth Street Railway has been sold to Morris Stone of Brockton and will be scrapped.

**Northern Ohio Traction & Light Company, Akron, Ohio.**—A contract will shortly be let by this company for the remodeling of a section of the Kenmore carhouse to make an addition to the adjacent shops.

**Northern Ohio Traction & Light Company, Akron, Ohio.**—The Northern Ohio Traction & Light Company is about to let contracts for the construction in East Akron of a five-track two-story carhouse and adjacent open storage yard with an initial capacity of seventy-five cars, the ultimate capacity to be 185 cars. The building will be of brick construction and arranged for light repairs on the first floor and trainmen's quarters and club rooms on the second floor.

### Trade Notes

**The Seneca Wire & Manufacturing Company, Fostoria, Ohio,** is planning to build a plant extension, 167 ft. x 208 ft., to cost with equipment about \$100,000.

**The Ohio Brass Foundry Company, Mansfield, Ohio,** contemplates the construction of a malleable-brass foundry, providing additional floor space of 80,000 sq.ft.

**The Rome Manufacturing Company, Railroad Street, Rome, N. Y.,** has filed notice of an increase in its capital stock from \$850,000 to \$3,000,000 for general business expansion.

**The Yale & Towne Manufacturing Company, Stamford, Conn.,** announces the resignation of John B. Milliken as treasurer. Mr. Milliken will be succeeded by Willard L. Case.

**The Chase-Shawmut Company, Newburyport, Mass.,** has sold its plant to Sears B. Condit, Jr., president of the Condit Electrical Manufacturing Company, South Boston, Mass.

**The Page Steel & Wire Company, Grand Central Terminal Building, New York,** announces the removal of its central district sales office from 29 South La Salle Street to 208 South La Salle Street, Chicago.

**The Southern Electrical Equipment Company, Charlotte, N. C.,** expects soon to be in a position to fill orders for substation equipment, high-tension and switchboard apparatus, which it is planning to distribute through jobbers.

**George C. Eggers,** has resigned as district manager for the E. T. Chapin Company and is now at the head of the Eggers Pole & Supply Company, 327 South La Salle Street, Chicago. The manufacturing headquarters are at 510 Empire State Building, Spokane, Wash.

**The McGill Ticket Punch Company, Chicago, Ill.,** has changed its name to the McGill Metal Products Company. The company recently moved into new quarters at 1640 Walnut Street, which will afford increased space and, according to the president, enable it to fill orders promptly.

**The Roller-Smith Company, 233 Broadway, New York City,** announces that it has made arrangements with the W. Montelius Price Company, 524 First Avenue, Seattle, Wash., to handle the company's line of electrical instruments, meters and circuit breakers in Washington, Idaho and part of Oregon.

**The Erie Electrical Equipment Company, Johnstown, Pa.,** manufacturer of insulator pins, pipe fittings, pole-line hardware, brackets, etc., is planning to build a malleable-iron foundry, equipped with electric furnaces, to cost about \$50,000. The company also contemplates increasing its capital stock from \$25,000 to \$100,000.

**The Doyle-Dacosta Manufacturing Company, Easton, Pa.,** is building an addition to its factory, providing approximately 5,000 sq.ft., which will enable the company to double its present capacity for the manufacture of coil windings. The company has recently begun the manufacture of armature and field coils for small electrical units.

**William Laird Brown** of Kelly, Cooke & Company, consulting and construction engineers of New York and Philadelphia, is representing American engineering interests in London at present, conferring with British manufacturing and financial houses to arrange for direct representation of English buyers in the American market. He will shortly take up the same work in Scotland, Italy and France.

**D. T. Laylin** has been appointed sales manager of the Adams-Bagnall Electric Company, Cleveland, Ohio. Mr. Laylin became associated with the electrical business in 1905, when he entered the service of the Western Electric Company. After being in charge of the electric sales and shop departments of the Strong-Carlisle-Hammond Company of Cleveland for five years, he became electrical engineer of the Standard Parts Company of Cleveland.

**The Buda Company, Harvey, Ill.,** announces the appointment of H. M. Sloan as treasurer, effective June 1. He was formerly assistant to the president of the Chicago, Milwaukee & St. Paul Railway and also served upon the War Industries Board during the war. Mr. Sloan started in railroad service with the Fremont, Elkhorn & Missouri Valley Railroad, was later transferred to Chicago to the vice-president's office, resigning to enter the Chicago, Rock Island & Pacific Railroad in 1902, of which he later became vice-president.

### New Advertising Literature

**Oil Circuit Breakers**—Westinghouse Electric & Manufacturing Company has issued six bulletins, Nos. L-3965-70, on oil circuit breakers.

**Superheaters.**—The Locomotive Superheater Company, New York City, has issued bulletin No. T-6, on superheaters for stationary power plants.

**Car Heaters.**—The Gold Car Heating & Lighting Company has recently issued a forty-page catalog supplement describing its equipment for heating and ventilating railway cars.

**Steel Armored Hose**—Sprague Electric Works of the General Electric Company, New York City, has issued bulletin No. 44553.1 on Sprague flexible steel armored hose for air couplings.