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MANUFACTURERS AND THE ASSOCIATION

If one can judge from the enthusiasm of those who were in attendance at the committee meetings of the American Electric Railway Association in Atlantic City last week, the October convention will be a great success. A gratifying number of manufacturers have joined the association under the new membership plan. There are still many who have not joined, but the proper committees are enthusiastically busy in the work of building up the membership. While many manufacturers were disappointed at the disruption of their association as it had been in the past, it will be more and more apparent as time goes on that full membership for manufacturers in the parent association will mean much more to them than simple membership in the old Manufacturers' Association. In this connection, however, it should be remembered that a strong committee of manufacturers was appointed to consider the perpetuation of some sort of a manufacturers' association, and this committee, no doubt, will report in the fall. If it appears that there is work to be done, no doubt a manufacturers' association can be perpetuated or the manufacturers who join the parent association can apply for a charter similar to that enjoyed by the Engineering and other affiliated associations. At any rate there is a definite plan before us, and that plan calls for the united membership of all those manufacturing companies who have the welfare of the electric railway industry at heart.

ELASTIC LIMIT DEFINED

A feature of the convention of the American Society for Testing Materials this week was the plan for defining that decidedly indefinite property of ferrous metals, elastic limit. This came with a recommendation from the committee on steel to revise its several existing specifications covering carbon-steel and alloy-steel forgings by the elaboration of the present clause which refers to this point and which states merely that elastic limit shall be determined by an extensometer. Naturally, this wording leaves a wide opening for the influence of the personal equation of the observer; so much so, in fact, that the term "elastic limit" has become almost meaningless. The substitute clause, on the other hand, provides for use of an extensometer which reads to 0.0002 in. This must be attached to the specimen at the gage marks, and not to the shoulders of the specimen nor to any part of the testing machine. The machine must then be operated so as to increase the load on the specimen at a uniform rate, and the observer is to note "the load at which the rate of elongation

shows a sudden increase." This load is the elastic limit of the tested material. The elaboration furnishes at least the improvement of increased definiteness, but unfortunately, with the practical disappearance of wrought iron, the cases where the change in the rate of elongation is really sudden are rare, so that, after all, the personal element of observation is still the dominating feature in the determination of this important quality of wrought steel.

CITY PARALLEL TO "EXCLUSIVE FRANCHISE"

The city of San Francisco and the United Railroads are again entering upon legal procedure over franchise matters, this time with a fair prospect of carrying the case to the Supreme Court. Last year, in the legal battle over the Market Street loop, apparent victory rested alternately with each side, but there was never a clear and final decision on the matter. Perhaps the most regrettable feature of this case was that all the trouble and agitation of public opinion could have been avoided, and the dispute settled out of court, if the disputants could have gotten together and frankly discussed the problem. President Lilienthal expressed that thought at the beginning, and it was that spirit and not a court ruling which eventually closed the matter. The new disagreement, which has been mentioned in our news columns, over the right of the city to parallel the tracks of a company to which it has given an exclusive franchise, is an entirely different matter, however, and there is no likelihood that any solution other than a resort to the courts could satisfactorily settle it. Such a case has never before arisen in this country, and if the municipal railway idea is to spread, the importance of the final decision in such a case is apparent. Because a question of constitutional rights is involved, the United Railroads has entered the case in the San Francisco District Federal Court, and it is generally agreed that an appeal is practically certain whichever way the decision goes. The decision in the lower court is important, however, for if it denies the petition of the United Railroads, the city could proceed with the construction, pending the passing of the case through the courts. If a decision adverse to the United Railroads should be handed down and be upheld by the higher courts, another serious hazard to electric railway properties will be created. It is hardly conceivable that the ultimate decision will be unfavorable, but assuming that the city could legally establish the rights of the stand it is taking, the confiscatory nature of the result indicates how unfair this course would be. The company has built up its system in good faith, believing in

the protection afforded by its franchise agreements with the city, and even if the city could legally repudiate its contracts, manifestly it has not the moral right to do so.

EVERY-DAY LAW—AND DUTY—FOR WOMEN

We have recently had occasion to speak of the waning tendency of popular magazines to publish articles of the corporation-baiting and exposé type, owing to the increasing consciousness and dislike by readers of exaggerated and unfair literature. Unfortunately, however, exceptions occasionally still creep into the columns of even the reputable magazines. For example, our attention has been called to an article entitled "Every-Day Law for Women," which appeared in the June issue of *Good Housekeeping*.

In discussing various points of advice to women on law, the article recounts in exaggerated but somewhat popular journalistic style the inconveniences suffered by the subpoenaed witness in accident cases. It then concludes its remarks on this subject by encouraging the feminine reader to withhold her name from the conductor, in case she should be present at a railway accident. In regard to personal injury in a trolley or railroad accident the author advises the injured party to refuse to see the claim adjuster but refer him to her lawyer. This advice is explained on the ground that fair-minded adjusters who are only interested in getting the facts in order to make a just settlement are as rare as "white crows," as the article expresses it; that the average claim adjuster generally visits the injured person when she is still sick and shaken, and by false sympathy and other craft persuades her to sign a release for a sum which later is often found to be in no way commensurate with justice or proportionate to the amount which could have been secured by suit or settlement through a lawyer.

In warning the injured persons against any intercourse with the claim adjuster, the article casts an absolutely unwarranted slur upon railway claim departments and the methods of railways in general. But, passing that point, it also excludes the course which is not only the most common but is also nearly always the most profitable to the injured person. We would not find fault with advice which suggests that any woman, or man either, who has an important business matter to decide, should talk it over with some one on whose business judgment he or she can rely. But this suggestion, when given to any one injured in an accident, should be coupled with a warning of the danger of going to shyster lawyers whose counsel as to what to do is certainly not apt to be disinterested.

The advice to witnesses of an accident to decline to give their names and addresses is on a par with that to persons injured in accidents, although perhaps more dangerous because it is likely to affect a larger number of persons. The effect of doing as the writer suggests is to prevent the truth from becoming known, and if everyone acted on this principle the courts would be helpless. We hear a great deal at present about "women's rights," but the fact cannot be too strongly emphasized that the citizenship of women,

and of men too, involves certain duties as well as rights, and one of these duties is to assist the courts in administering justice. It is hard to imagine any more pernicious counsel short of actually advocating crime, than that of preventing the disclosure of essential facts in a case at law.

ELECTRIC RAILWAY PROSPECTS

The article by Professor Conway, appearing on another page of this issue, presents a timely discussion of factors affecting the electric railway business, particularly with reference to the securing of new capital. We are now in a period when electric railway gross and net earnings are showing, on the whole, a gratifying increase, and an analysis of what this situation means is important. If the benefit is to be permanent, capital to build extensions to existing lines and to promote new enterprises can be obtained. There are a number of adverse conditions, Professor Conway frankly admits, but he points out that in several respects there is a close parallel between the present situation and that after the business revival in 1907, when the electric railways had an important period of growth. Personally, we are not inclined to take quite as sanguine a view of the immediate future as the author of the article. The present increases in earnings are gratifying, but, as we pointed out recently, there is a certain "lag" in electric railway operation between greater expenses from higher unit costs of material and labor and higher earnings so that, in the interim, the net earnings will be better than they will be when the higher operating costs begin to be reflected in the monthly report. Another adverse condition which did not exist eight years ago is more stringent regulation and service conditions, and another is higher taxes.

On the other hand, there are a number of favorable conditions. One of them is greater efficiency of apparatus, brought about by the development of the art, and another is the regulation already mentioned, which, while it brings certain burdens, also puts electric railroading on a firmer business basis and gives greater security for at least the principal invested in the business as well as greater assurance that some return, even if it is not a large return, will be allowed on the investment. Professor Conway, of course, recognizes and refers to all of these factors in his article, but we mention them in a slightly different relationship so as to emphasize the character of the different conditions. Broadly speaking, we believe that those factors mentioned above as favorable are of a more permanent nature than those which are adverse. Electric railways are necessary to welfare of the community, and the fact is becoming better recognized that they must receive encouragement to develop according to the needs of the public. Several important problems confront the industry, and one of the most important of them is the best form of making an increased charge for transportation or otherwise increasing the return to capital. But the fundamental conditions are sound, and noticeable advance has been made in solving the question of greater net earnings.

ELECTRIC RAILWAYS IN PREPAREDNESS

The program of the thirty-fourth annual convention of the New York Electric Railway Association held in Niagara Falls this week was unusual in that it dealt with no technical phases of transportation. Almost the sole topic discussed was the utilization of the electric railways of the state in mobilizing troops and supplies. The interest which such a subject would always excite was naturally accentuated by the tension over the Mexican situation, and it crystallized in the determination to form a committee on military service which should conserve the results of the preliminary work.

The program on preparedness presented at the meeting was largely the result of two months of effort on the part of a specially-appointed committee which discharged its duty by systematically gathering, compiling and interpreting the fundamental data of the subject, namely, the numbers of men and amounts of material to be mobilized, and the electric railway facilities available for mobilizing them. The committee report, which is abstracted elsewhere in this issue, is a model of directness, meatiness and brevity. It will undoubtedly prove suggestive to other associations. In a perspective, or more accurately, a birdseye view of this report and the accompanying papers and discussion, several points project conspicuously. First, there is evident a desire on the part of railway men as citizens to place their services at the disposal of their country with the hope that their hard-won skill in transportation lines will be utilized directly or indirectly. Further, granting that mobility of men and supplies is in importance second only to intelligent planning, it follows that the flexibility, transporting capacity and availability of the electric railway qualify it as a most useful adjunct to the steam railroad in the national defense. And the skill developed by men in handling electric railway traffic is available in other transportation problems outside this immediate field, such as dispatching road traffic in military operations.

Of course, the patriotic service of electric railway companies and of their personnel does not end here. The railways are employers of large numbers of men above the average in physical condition, and it is gratifying to note the number of railway men who have joined their commands in the National Guard now at points of mobilization in the different states or on their way to the Border. It is equally satisfactory to note that many electric railway companies have announced their decision to continue the payment of regular salaries to those of its employees who are thus called to military duty. The McGraw Publishing Company has issued such a notice and the ruling applies not only to the *ELECTRIC RAILWAY JOURNAL* editorial and business staffs but to all of the papers issued by the McGraw Publishing Company—*Engineering Record*, *Electrical World*, *Metalurgical and Chemical Engineering* and the new paper, *Electrical Merchandizing*, which will make its initial appearance next week. Members of this organization affected by this order will, insofar as possible, be re-

tained on the payroll and returned to the positions they now occupy when the need for their military services has ceased.

AMMUNITION FOR PUBLICITY CAMPAIGNS

The surest way to reach the public is through the newspapers and popular magazines. The advertising pages of these are good, but the editorial pages are infinitely better. To obtain admittance to the editorial pages, however, an article or news note must appeal to the editor as having news value, that is, it must tell something that a considerable portion of his readers want to know. The criminal element in the community produces an inordinate proportion of the news, and it is discouraging to a legitimate news producer like the railway to have to compete with the underworld for space in the public print. It is vital to the future of the industry, however, that it successfully compete because its welfare will depend on the popular understanding of its problems and just treatment at the hands of the representatives of public sentiment. It needs no argument to prove that the electric railways, with a few notable exceptions, have hardly made a start in securing the co-operation of the newspapers of their respective communities. There are at least two perfectly obvious reasons for this, namely, absorption in the difficult problems of administration and the non-sensational character of railway events. A murder case bristles with news. Every word that anyone who has had any connection with the case says about it is of interest to the public, or is supposed to be so in the newspaper office. The fact that the local railway company is trying out a new form of car designed better to serve the public and to decrease the operating ratio is not thought by the average editor to be so inherently interesting, although it touches the people much more closely than the murder does.

The problem of the railway management to-day is therefore to impress on the people through the editors, and to a limited extent through advertising, the really significant things about the transportation business. This is far from easy, but it must be done. The railway manager must first develop his "nose for news" in his own industry. He must discover the interesting things on his own property, and there are plenty of them. He must co-operate with the editors with a view to informing them of his and the industry's problems and getting the editors to study them. One of the functions of the *ELECTRIC RAILWAY JOURNAL*, and a function of no mean importance, is to supply the managements of the railways with ammunition for publicity campaigns. With its elaborate machinery for gathering the news of the industry, it is able to indicate the tendencies of the time and to illustrate these with numberless news items. Surely every railway manager can find something each week which has news value in his community and which, properly co-ordinated with the local circumstances, would appeal forcefully to the editors of the community. It is the man on the job who can use this ammunition most effectively. Why not try the experiment this week?

Electrification of an English Freight Line

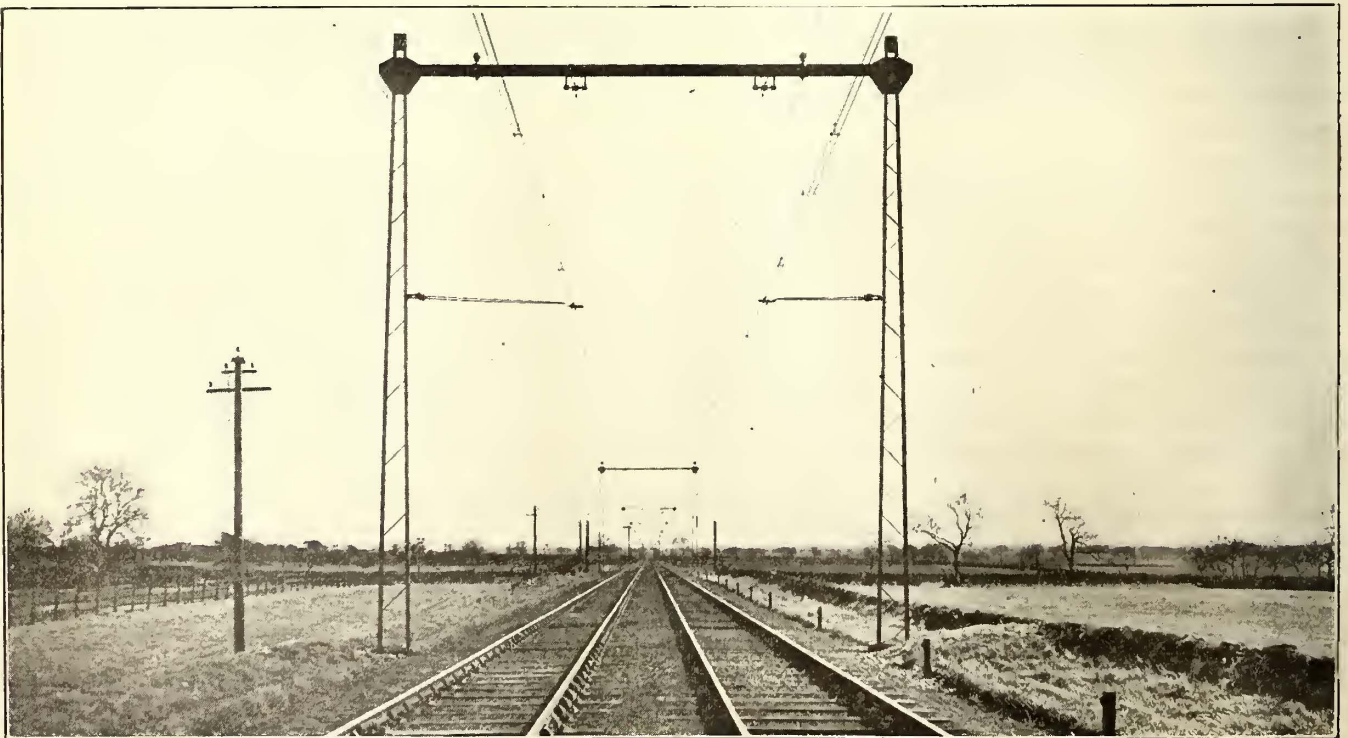
Electric Operation of Freight Trains Has Been Introduced on the Shildon-Newport Branch of the North Eastern Railway in England—Locomotives of 74 Tons Weight Are Used, Direct Current at 1500 Volts Being Supplied From an Overhead Catenary System

CONSIDERABLE historical interest attaches to the electrification of the Shildon-Newport freight line of the North Eastern Railway in England. The track extends over a portion of the original right-of-way of the first public railway on which steam locomotives were used for conveying passengers and freight, the line having been opened in the year 1825. Interest attaches to the installation also because it is the first application of electric traction in England to heavy freight haulage, and here it may be said that this is the second time that the North Eastern Railway has acted as a pioneer in the use of electric operation, inasmuch as the company made its first electrification in 1904 in connection with suburban traffic.

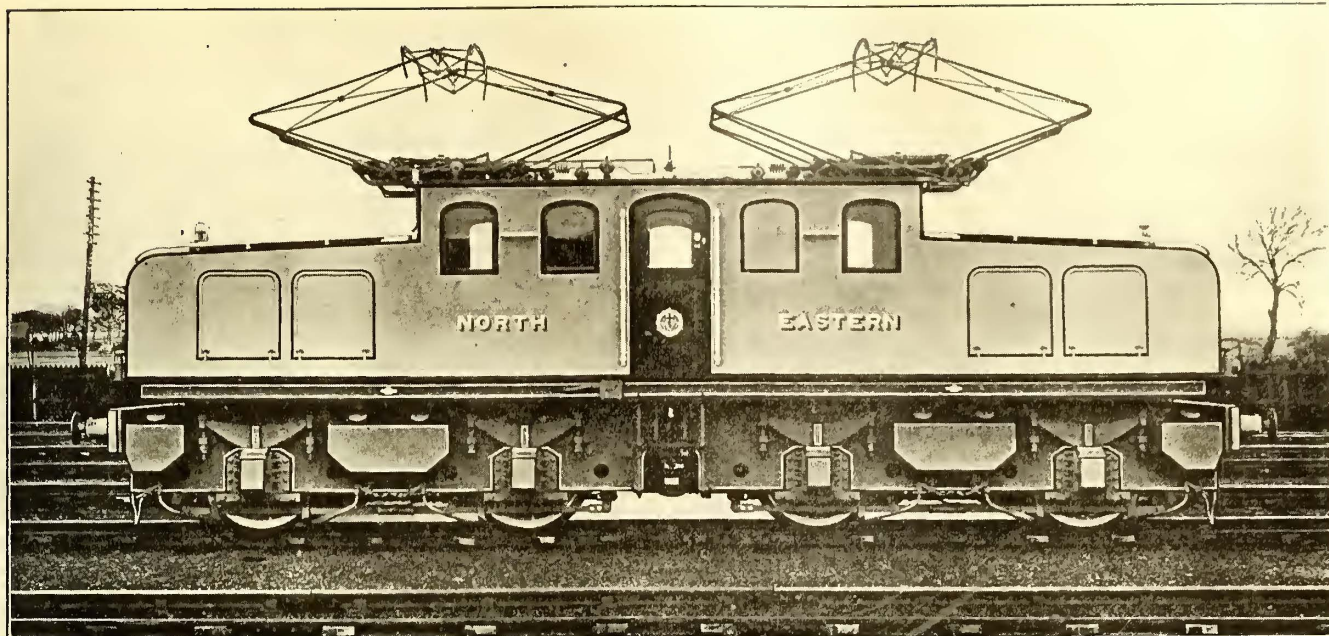
The Shildon-Newport route is an important freight line dealing almost exclusively with heavy coal and ore traffic, and it has been electrified as an experiment in connection with a decision of the company's general manager, Sir A. Kaye Butterworth, to consider generally the possibility of electrification on the North Eastern Railway System. Construction work was begun subsequent to a visit of the railway company's chief mechanical engineer, Vincent H. Raven, and Charles H. Merz of Merz & McLellan, the company's consulting electrical engineers, to the United States in 1911. Electric operation was inaugurated on July 1, 1915, with a limited number of trains, as the overhead construction was not then completed, the service having been gradually extended since that time.

In addition to the usual considerations affecting the decision to apply electric traction to the line, there was a special factor which differentiated the division from others in the United Kingdom. This was because the production and distribution of electric power has been developed upon a larger scale on the northeastern coast of England than in any other part of the country, and a large proportion of the energy derived from electric generating stations which use as fuel the waste heat and gases derived from coke ovens and blast furnaces in the Durham and Cleveland districts. An ample supply of cheap electrical energy was, therefore, available from the systems of existing power companies, and this fact, obviating as it did the necessity for a large capital expenditure by the railway company on a power station, had an important bearing upon the whole scheme.

The electrified line has a route approximating 19 miles in length, and it connects the freight terminal at Shildon, one of the largest classification yards in Great Britain, with the Newport yards near the town of Middleborough. The sidings at both ends of the line are electrified in part, so that altogether about 50 miles of single track are equipped for electric operation. The line carries a heavy coal and ore traffic from the Southwest Durham coal fields to the Middleborough district, supplying a large number of blast furnaces and iron works concentrated there. The general gradient of the line is in favor of the laden traffic, the ruling grade being about 1 per cent. On the return journey the load



BRITISH FREIGHT ELECTRIFICATION—TYPICAL OVERHEAD CONSTRUCTION ON TANGENT TRACK



BRITISH FREIGHT ELECTRIFICATION—SIDE VIEW OF LOCOMOTIVE

consists mainly of empty cars that are being returned to the yards at Shildon.

LOCOMOTIVES

The locomotives are designed to haul trains weighing 1400 tons at a speed of not less than 25 m.p.h. on the level. They were designed and built at the railroad company's shop, the electrical equipment having been installed by Siemens Brothers' Dynamo Works, Ltd., Stafford. The construction is of the articulated-truck type, the trucks being connected by means of a buffer coupling arranged for lateral movement with vertical rigidity. The trucks are held together by a drawbar and spring, which can be adjusted for tension, but which cannot be subjected to excessive compression, as a portion of the coupling between trucks receives the buffing stresses directly through the truck frames. The cab is at the center of the engine, and sloping ends are provided to contain the resistance, contactors, switches and all high-tension electrical apparatus. The pantographs on the cab roof are raised by compressed air, and an arrangement is made whereby the doors on the sloping ends of the cab can be opened only when the air is released and the pantographs are not in contact with the overhead wire. The dimensions and weights of the various parts of the locomotive are as follows:

Weight of electrical equipment.....	48,500 lb.	Length of commutator.....	7 3/4 in.
Weight of mechanical parts.....	100,300 lb.	Number of segments.....	195
Total weight.....	148,800 lb.	Width of air gap.....	15/64 in.
Approximate height, center of gravity.....	4 ft. 6 in.	Normal speed of locomotive.....	25 m.p.h.
Length of motor over windings.....	24 13/16 in.	Speed of motor.....	737 r.p.m.
Length over core.....	11 11/16 in.	Length of locomotive over buffers.....	39 ft. 4 in.
Diameter of armature.....	21 1/8 in.	Width over footplate.....	8 ft. 4 in.
Diameter of commutator.....	18 7/64 in.	Total wheelbase.....	27 ft. 0 in.
		Truck wheelbase.....	8 ft. 9 in.
		Truck centers.....	18 ft. 3 in.
		Wheel diameter.....	4 ft. 0 in.

The main equipment of each engine consists of four fully-inclosed motors, each of which drives an axle through single-reduction, twin gears with a face dimension of 3 15/16 in., the gear ratio being 1:4.5. The motors are wound for 750 volts, the pair on each locomotive truck being connected permanently in series and controlled with the usual series-parallel system. Each motor is capable of developing 275 hp. at a speed of 20 m.p.h., with forced ventilation providing for 700 cu. ft. of air per minute passed through the motor case. The equipment is capable of exerting a torque sufficient to

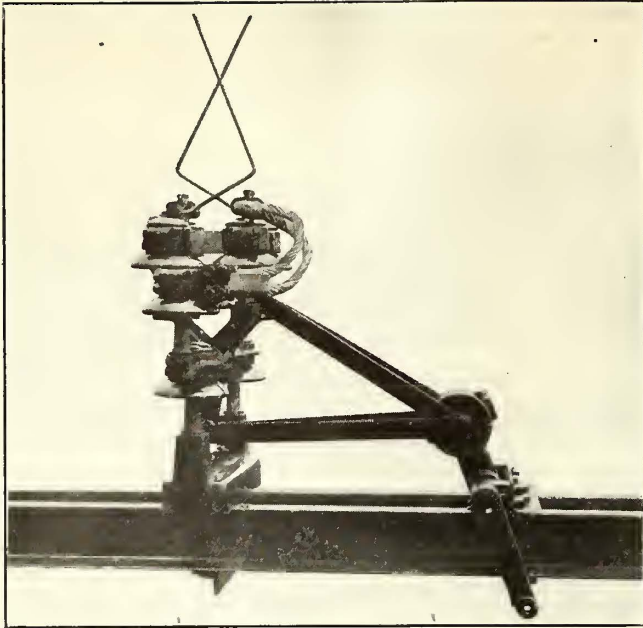
slip the wheels under any condition of rail, and can exert an average drawbar pull of 28,000 lb. under normal conditions of rail.

The motors are designed to run at a limiting speed of 45 m.p.h., but the normal rate on level track is 25 m.p.h., at which speed a train of 1400 tons can be hauled. The locomotive is capable of accelerating to normal speed a train of 800 tons on a grade of 1 per cent, and in general the design is such that each unit can make four round trips in twelve hours, each trip consisting of a run from Shildon to Newport with a train of 1400 tons, followed by a run from Newport to Shildon with a train of 800 tons, the distance of each half trip being about 18 miles.

Provision is made for either hand or automatic acceleration, the automatic arrangement consisting of a spring, which is wound up by the controller handle so that the speed at which the controller drum follows the handle can be governed by a step-by-step escapement movement. The maximum current taker at each step is controlled by a limit switch, so that when the current rises beyond a predetermined limit a magnetic interlock has its circuit closed and locks the escapement, holding the controller drum until the current has fallen to the required value. A catch is provided inside of the controller which can be lifted when it is desired to disconnect the automatic action and to notch up by hand. A special acceleration switch is also provided so that under unusual circumstances the adjustment of the limit switch can be altered by short-circuiting some of the turns of an opposing coil, thus allowing the passage of a greater accelerating current.

In general the control contactors are electrically operated and are fitted with auxiliary interlocking contacts to insure operation in the correct order. The main automatic circuit breaker is installed on the cab roof, being provided with horn gaps which project through the roof, and red and green lamps are installed to indicate whether it is set or tripped.

Current for the control circuits, as well as for the lighting and heating of the cab, is provided at 750 volts by duplicate dynamotors mounted on the cab floor. These machines have double-wound armatures fitted with two commutators, the control circuit being tapped off between the center point and the earth. The shaft of each machine is extended and is fitted with a fan to



BRITISH FREIGHT ELECTRIFICATION—SECTIONALIZING SWITCH

supply ventilating air for the main propulsion motors. The rated continuous output of each machine is 4.5 kw. The locomotive cab contains, also, the usual motor-driven air compressor for the brake equipment, and there is a hand pump to raise the pantograph when the air supply is low.

Two pantographs are provided on each locomotive, and each one has two contact pans fitted with aluminum rubbing strips to make contact with the overhead copper wire. Thus there are four rubbing strips per locomotive, which with the double contact wire makes eight points of contact. Each of the two contact pans is attached to the pantograph frames by two separate leaf springs, so that any small irregularities in the level of the contact wire are provided for independently of the vertical movement of the pantograph itself.

OVERHEAD CONTACT SYSTEM

As before mentioned, the locomotives are supplied with direct current at 1500 volts through overhead con-

tact wires, the current supply coming from two rotary-converter substations. On the most important portions of the track the overhead contact consists of two hard-drawn copper conductors each of 0.155 sq. in. section, or, say, 200,000 circ. mil, but on sidings where the loads are not heavy a single contact wire is used. Two auxiliary stranded copper feeder wires, each of 0.194 sq. in. section, or, say, 250,000 circ. mil, are carried on the top of the steel structures and are connected in parallel with the main contact wires at frequent intervals.

The wires are supported by a solid steel auxiliary catenary wire to which they are attached by sliding clips. This auxiliary catenary is in turn suspended from a main stranded steel catenary by means of steel wire hangers. The main catenary is supported from steel structural bridges of light weight by means of special insulators, double insulation being used throughout. The normal span between the steel bridges is 110 yd., but on curves and sidings they are placed at shorter intervals, depending on the existing conditions.

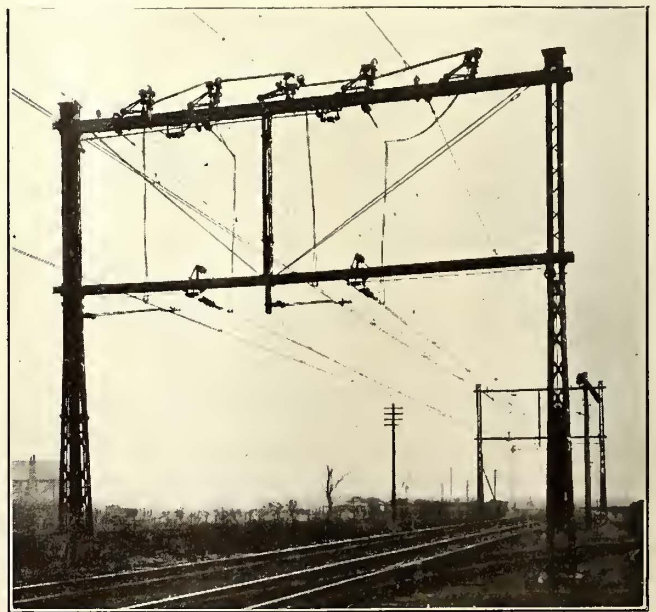
Normally, the height of contact wire from rail is 16 ft. 6 in., but at grade crossings this is increased to 18 ft. 6 in., and under some of the low bridges, of which there are a large number on the route, the height from the rail level is reduced, the minimum being about 13 ft. 8 in.

Each supporting structure carries a pair of steadying arms which are pivoted in all directions and are attached to the contact wires by clips. These fix the position of the contact wire relative to the track in a horizontal plane, the contact wires being staggered in the customary manner to prevent undue wear at the pantograph shoes. On curves, a center strut steadied by steel tie rods is added, the steadying arm on the mast at the inside of the curve being removed and fixed to the center strut so as to place the steadying arm in tension.

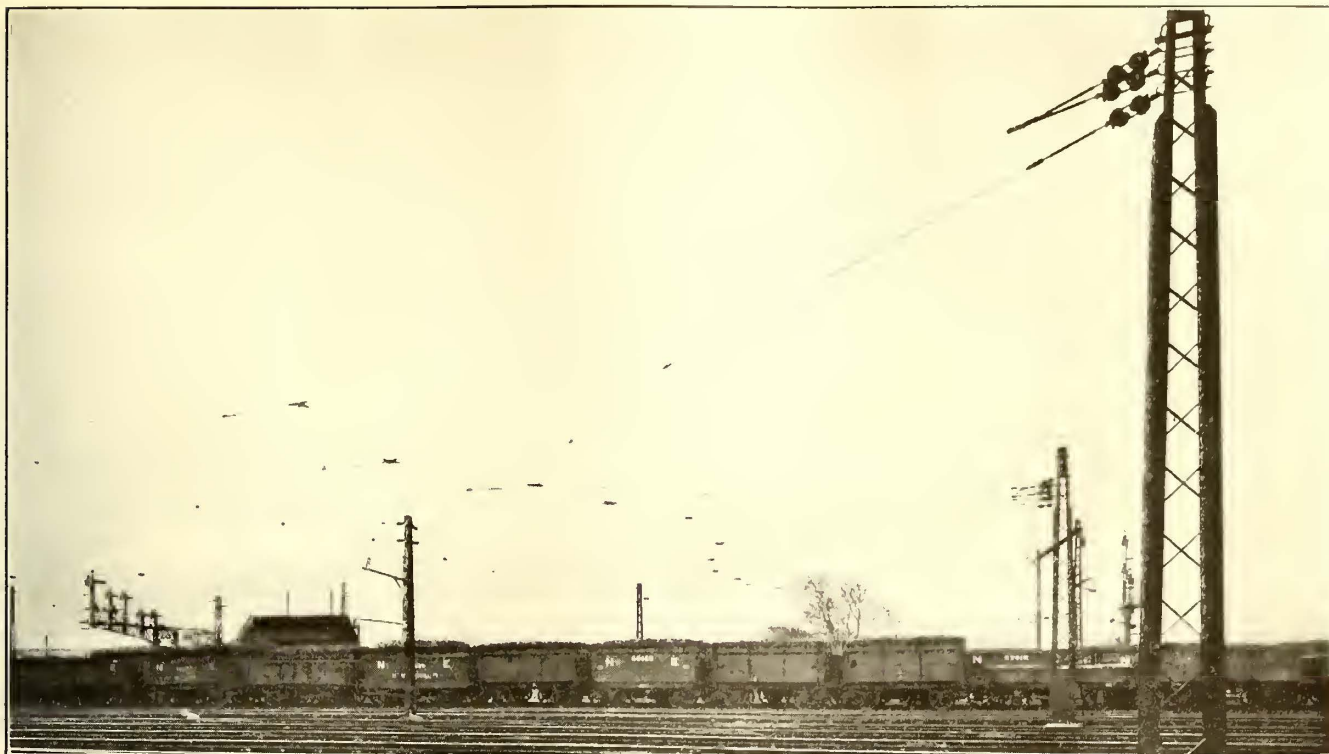
In special cases on sharp curves independent pull-off masts have been installed. Also, some of the structures are arranged to cover four tracks of which only two are provided with contact wires, and in this case a strut is provided in the center to carry the steadying arm and avoid the use of a center mast. Some cantilever constructions for bridges have been adopted in places where it was impossible to erect two masts, and in a few cases wooden poles have been used, but the latter were introduced largely for experimental purposes.



BRITISH FREIGHT ELECTRIFICATION—OVERHEAD CONSTRUCTION AT CURVE



BRITISH FREIGHT ELECTRIFICATION—BRIDGE WITH AUTOMATIC TENSIONING DEVICE



BRITISH FREIGHT ELECTRIFICATION—TERMINAL FOR CONTACT WIRES IN YARD

All of the steel structures carrying the overhead track equipment are bonded to the running rails by means of a hard copper bond of 0.08 sq. in. section, or approximately No. 00 wire. Also, any steel structures carrying signals that are in proximity to the electrical equipment, are similarly bonded to the running rails.

Automatic tensioning has been adopted for the contact wires to limit as far as possible the sags due to temperature variations. The tensioning points are approximately 1100 yd. apart, and at these locations two structures are installed 65 yd. apart, so that the wires from opposite lengths overlap by this amount. The end of each contact wire is raised at the tensioning structure to which it is fixed to give it a height about 18 in. clear of the normal level at that point, so that the locomotive pantographs ride gently and without shock from one tensioning length to the next. The contact wires are anchored to the auxiliary catenary wire at a point two-thirds of the distance along each tensioning length in the direction of train movement.

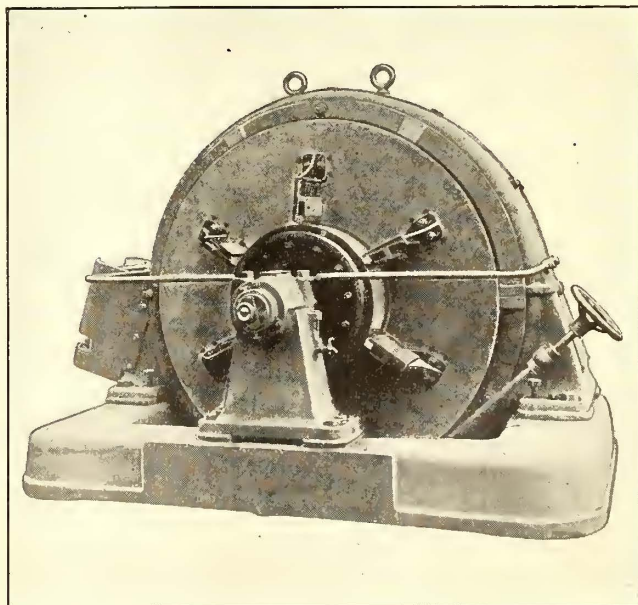
The tensioning structures consist of strong steel masts made up of four angle irons with angle-iron bracing, together with two cross girders and a center strut. The tensioning weights are slung at the center of the structure by chains passing over pulleys that are attached to the contact wire. By this means a normal tension of about 2000 lb. is maintained in the double contact wires.

In all cases the auxiliary catenary wire is anchored to the lower girder of the tensioning structure, but the main catenary is continuous except at tensioning points where section switches are installed. At such points the main catenary is also anchored to the structure, but in this case the top girder is used for the anchor.

On some of the sidings where only switching work is done a single contact wire is used with ordinary trolley span-wire construction. For sidings which are not equipped throughout their entire length, and which require overhead construction only to permit the electric locomotive to enter and pick up a train, the wires are terminated at bridges as shown in one of the accom-

panying illustrations. At such points, danger boards have been erected, and the electric locomotives are not permitted to pass these, although the terminal construction is of such a nature that no damage would be done to the pantograph or overhead construction in case this should happen.

At some of the low bridges it has been necessary to make special provision to obtain the necessary overhead contact. In these cases the contact wires, together with the auxiliary catenary, are brought toward the center of the bridge so that contact is made at the extreme edge of the pantograph shoe, the main catenary wire being anchored to the bridge. In order to prevent the other edge of the pantograph shoe from striking the bridge, a guard wire is installed, this being anchored



BRITISH FREIGHT ELECTRIFICATION—ROTARY CONVERTER INCLOSED TO MINIMIZE FLASHOVER

to the catenary structures on either side of the bridge and being made live only while a locomotive is passing underneath it.

The track is sectioned at intervals of about $2\frac{1}{2}$ miles and considerably more frequently on sidings. Section points are located in most cases at tensioning points so as to avoid the use of section insulators. The type of sectionalizing switch that has been adopted is shown in one of the illustrations, and from this it will be seen that a horn break arrangement has been provided for them. They are erected on the top girders of the catenary structures, and are operated by levers in the nearest signal cabin, being connected through pipes and bell cranks customarily used on manually-operated interlocking plants. As the train-control system of working is in use on the route, the signal cabins are connected by telephone with a central control office situated at Newport, and the handling of these sectionalizing switches is directed from the same point.

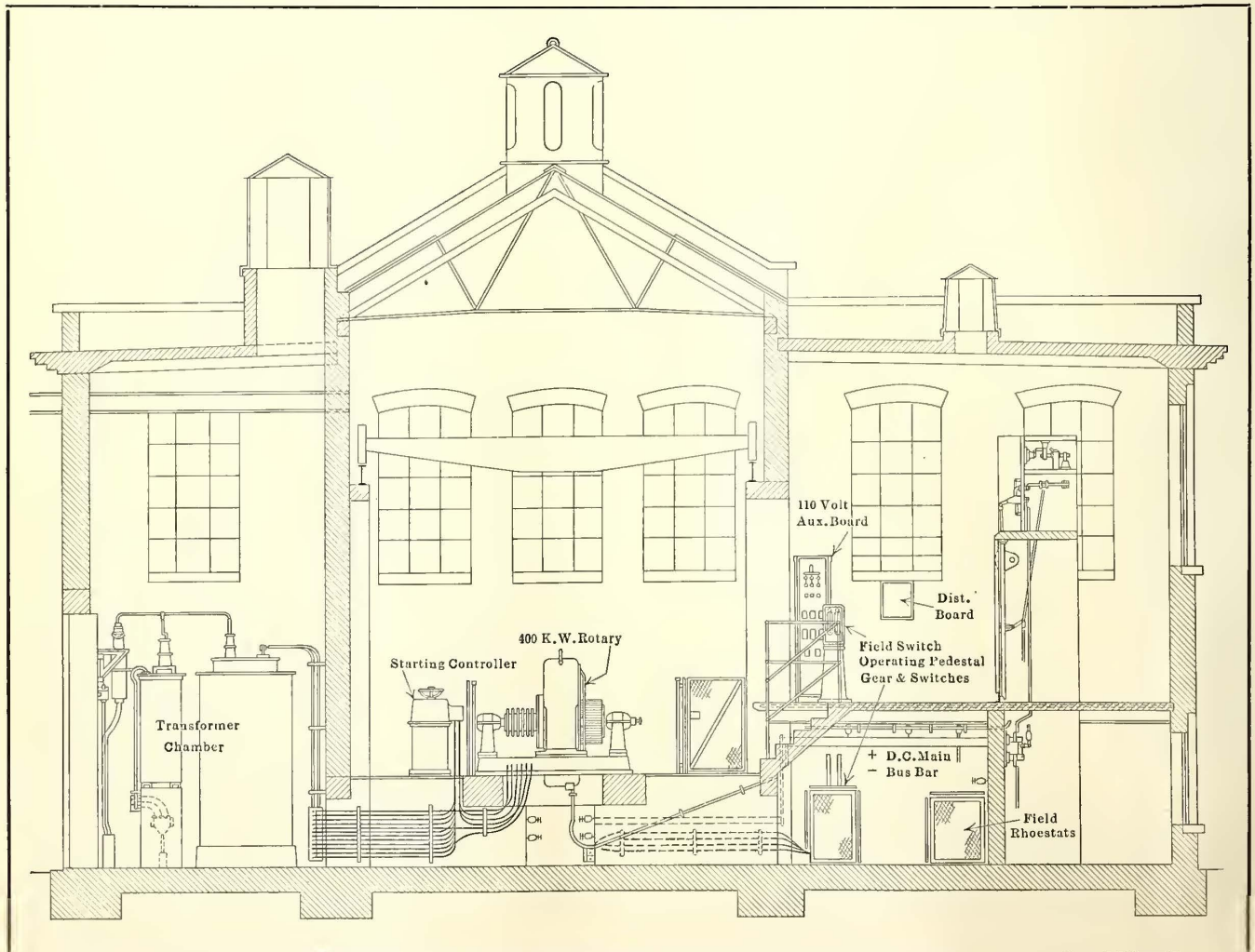
The track rails are bonded at the joints with stranded copper bonds fitted under the joint plates, two bonds each of 0.109 sq. in. section, or approximately No. 000 gage, being fixed at each joint. The rails are also cross-bonded at intervals of 300 ft., and bonds are installed also between the two inner rails of adjacent tracks at the same space intervals, but staggered with the cross bonds.

SUBSTATIONS

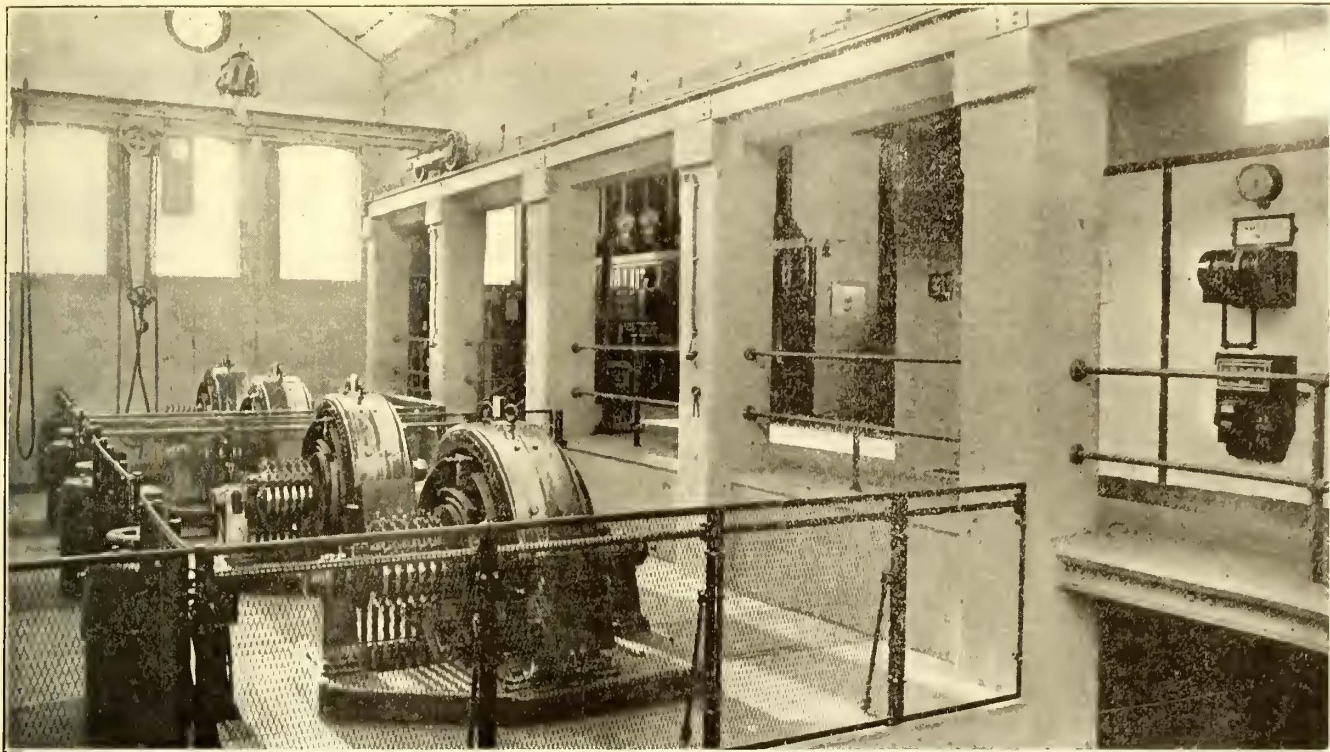
The electrified line is fed by two substations, one at Erimus, near the Newport end of the route, and the other near Aycliffe, at the junction with the main line

of the North Eastern Railway, which is about 4 miles from the Shildon end of the electrified section. Each has a separate supply of high-tension power purchased from local companies, the voltages being respectively 20,000 and 11,000. Three-phase current is furnished in both cases, and this is converted into direct current at 1500 volts by rotary converters connected two together to form one unit. Two 800-kw. units are installed at Aycliffe and one 800-kw. unit at Erimus, each unit consisting of two 400-kw., 800 r.p.m., 750-volt, 40-cycle, six-phase, commutating-pole rotaries.

The machines were designed to operate normally at 95 per cent leading power factor and to withstand an overload of 50 per cent for two hours, 100 per cent for ten minutes and 200 per cent momentarily. They were required to withstand a high potential test of 5000 volts for five minutes, and on account of the high voltage on the commutator, they were specially designed to avoid damage due to flashovers occasioned by short-circuits on the system. Consequently, the operating parts of the brush gear were entirely inclosed, and the distance between brush arms was made as great as possible, the commutator being completely screened by arc-proof insulating material from the armature and frame of the rotary. Severe tests were carried out to determine what load could be suddenly thrown on and off without causing a flash. Out of five times that full load was thrown on no flashes occurred, and out of seven times when full load was automatically tripped off with a breaker only four were followed by a flashover. These machines were furnished by the British Thomson-Houston Company, Ltd., of Rugby, and this company is at



BRITISH FREIGHT ELECTRIFICATION—CROSS-SECTION OF SUBSTATION



BRITISH FREIGHT ELECTRIFICATION—INTERIOR VIEW OF SUBSTATION

present installing at Erimus another set of 1200-kw. capacity, consisting of two 600-kw. rotary converters coupled in series to form one unit.

The substations in general are arranged in three sections, one for the switch gear, one for the rotaries, which on account of the high tension are surrounded by screens, and one for the transformers. In connection with the latter it may be said that two auxiliary transformers installed in each substation are connected directly across the high-tension terminals of the main transformer. They are fitted with a double secondary winding, one section being used exclusively for metering and the other for supplying lighting and auxiliary power in the stations for portable air compressors and the like. The transformers were furnished by the British Westinghouse Company as sub-contractor to the British Thomson-Houston Company, which acted as main contractor for the substation plants and their equipment.

Each substation is connected to the overhead contact system by four positive feeders consisting of paper insulated, bitumen-sheathed, single-wire, armored cables each of 0.5 sq. in. section, or, say, 600,000 circ. mil, laid in a wood trough that is filled with bitumen. At each substation there are two negative cables which connect the track rails to the negative busbar, these being similar in size and type to those used on the positive side.

Progress on Large Viaduct in Texas

The engineering department of Stone & Webster is completing work on the Northern Traction Company's new large steel and concrete viaduct at the foot of Jefferson Street, Dallas, Tex. This long structure, which will extend from Arlington Street to a point just north of the street railway and interurban bridge across the Trinity River, will span the cluster of steam railroad tracks entering the new Union Basin. It is hoped to complete the viaduct by the time the railroad station is open for public use. The girders which will rest on the concrete form, will be incased in concrete to protect

them from the destructive gases thrown off from locomotives as they pass the viaduct. Three of these steel spans have a total weight of 50 tons. When completed, the floor of the viaduct will be of reinforced concrete, on which surface will be laid layers of crushed rock supporting a double tracking.

Chicago Loop Cleared for Preparedness Parade

In order to make way for the military preparedness parade, which occurred on June 3, all cars of the Chicago Surface Lines, as well as all vehicular traffic, were turned back outside of the loop district bounded by the Chicago River on the north and west, by Harrison Street on the south, and by Lake Michigan on the east. The Chicago Surface Lines began turning back cars before 8.30 a. m. and they did not enter the loop district again until the entire parade had passed late at night. During the progress of the parade, however, the elevated railroads continued operation into the loop, and in order to handle the crowds expeditiously Britton I. Budd, president, personally directed the movement of trains for a period of twelve hours. At the close of the day it was estimated that approximately 1,200,000 persons had been carried on the elevated lines and all past traffic records for this system were exceeded, the average being about 560,000 passengers handled daily.

Public utility companies, including the Peoples Gas Company, the Commonwealth Edison Company, the Chicago Surface Lines and the Chicago Elevated Railroad were represented in the parade by 7876 marchers. The representatives of the elevated railroads were headed by their own band of fifty pieces, and the employees of the surface lines wore continental cocked hats. Bion J. Arnold and a number of prominent steam railroad engineers headed the engineers' division, which was represented by more than 2300 marchers. Gen. George H. Harries of Omaha, Neb., led the H. M. Byllesby & Company representatives.

Current Tendencies in the Railway Business

Author Discusses Effect of Jitneys on Financing and Earnings—Danger of Jitneys in Strikes—According to Analogy Based on 1907, Revival in Gross and Net Earnings Is to Be Expected

By THOMAS CONWAY, Jr., Ph.D.

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AT a time when the return of business prosperity is bringing a decided increase in service demands with the consequent requirements for new capital to provide the necessary facilities, it is pertinent to analyze some of the factors that have recently affected and are now affecting the position of electric railways in the security market.

EFFECT OF JITNEYS ON FINANCING AND REVENUES

It is beyond question that the electric railways have been subject to more adverse influences in the last few months than any other class of public utilities. The foremost place in these adverse factors must be given to the jitney. A year ago, when this sporadic plague was in its prime, it was almost impossible for a large proportion of the electric railways to do any new financing. As a matter of fact, however, the demands for new capital at that time were small on account of the business depression and the lessened demands for service.

According to statistics compiled by the New York *Journal of Commerce* and the *Commercial & Financial Chronicle* and published on page 835 of the *ELECTRIC RAILWAY JOURNAL* for April 29, the total volume of new securities issued and sold by electric railways in 1915 was \$135,423,000. This was a decrease of \$56,658,600 from the amount of securities marketed by such carriers in 1914. That the electric railways were not the only utilities to show decreased financing, however, is shown by the fact that the total sales for other classes of utilities in 1915 aggregated \$188,457,100, a decrease of \$88,700,900 from the amount marketed in 1914. In view of the great alarm felt over the threatened inroads of the jitney, the relatively fair showing made by the electric railways is encouraging. The explanation seems simply to be that the jitney did not imperil the solvency of the great majority of the electric railway companies.

Indeed, nothing is more remarkable than 1915 earnings of the electric railways, in view of the jitney competition and other unfavorable factors then prevailing. According to the *Commercial & Financial Chronicle*, as noted on page 838 of the *ELECTRIC RAILWAY JOURNAL* of April 29, the combined gross earnings of 272 roads in 1915 were \$513,967,674, a decrease of only \$60,728 or 0.01 per cent. The showing of net earnings was but little less remarkable, inasmuch as the net for 1915 aggregated \$194,893,975, a decrease of \$2,027,737 or 1.03 per cent.

If anyone had declared a year ago that the destructive influence of the jitney upon electric railway earnings would be so slight, he would have been regarded as an optimist of the first order. There can be no doubt, of course, that the influence of jitney competition was neutralized somewhat by the recovery of business in the latter months of 1915, the period when jitney competition was fast dwindling. In fact, the heavy decrease in earnings during the early months of the year was offset by the corresponding increase in the autumn and winter months. As far as the statistical results

are concerned, therefore, the electric railway industry has not relinquished its proud and unique position of remarkable stability of earnings, both gross and net, alike through years of prosperity and of depression.

The effect of jitney competition, and of the European war as well, is to be seen, however, not so much in the actual decrease of earnings as in the stunting of the natural growth of earnings. For the properties reporting gross earnings to the *Commercial & Financial Chronicle* from year to year the normal rate of growth each year from 1909 to 1913 inclusive has been about \$30,000,000 per annum. In 1914 the increase in gross earnings over 1913 amounted to only \$4,798,944. The marked decrease of about \$25,000,000 in the normal rate of growth was the direct result of the acute business depression which swept over the country after the outbreak of the European war, while the change to a slight loss in 1915 was caused by the aggravation of the general situation through jitney competition. If we turn to net earnings, we find that the normal increase has ranged from \$10,000,000 to \$14,000,000 per annum from 1910 to 1913 inclusive. In 1914, however, the net earnings decreased \$1,126,315. In 1915, as has been said, a still further decrease was experienced, the result being that in 1915 the companies earned about \$4,247,545 less than in 1913. Such is the net result of the European war and jitney competition.

THE ENCOURAGING LESSON OF 1907

If history repeats itself the next few years should hold great prosperity for the electric railways. The analogy of the period of depression following the panic of 1907 is directly in point. In 1908 the annual increase in gross earnings fell from a normal level of more than \$25,000,000 to about \$3,000,000 as compared with the preceding year. In 1907 the net earnings, which had normally been increasing at the rate of \$12,500,000 per annum, increased only \$4,951,601 over the figures for 1906, while in 1908 the increase over 1907 was only \$1,118,204. The situation throughout this period was quite similar to that which has prevailed since 1913, the difference being that the reduction in earnings, as the result of the panic of 1907 and the consequent depression, was much less. With the revival of business activity in 1909, a most interesting situation, similar in character to that which has always existed in like circumstances, was evident. The gross earnings for 1909 were \$29,298,657 larger than they had been in 1908, while the net earnings showed an increase of \$19,746,859. In brief, net earnings were almost 30 per cent greater than they had been in the year preceding the panic of 1907.

There had been a pause in the growth of business and of earnings. Men were out of work or working part time. The amount of travel for pleasure and shopping was curtailed. This accounted for the shrinkage in the rate of growth in the business of the electric railways. Population, on the other hand, had been steadily increasing. Hence, when business prosperity returned

and the unemployed secured work, those on part time were put on full time, and the larger family budget made it possible to renew the former scale of expenditures. The sudden increase in gross earnings made up for the tardy rate of progress in the preceding years. If business conditions remain as satisfactory throughout 1916 as they are at the present time it seems safe to predict that the net earnings of the electric railways in 1916 will duplicate the performance of 1909. The industry should witness a sharp revival in gross and net earnings.

THE JITNEY IS BECOMING HISTORIC

An examination of electric railway monthly earnings supports the foregoing conclusion. The jitney is passing into history. The regulatory legislation passed by various State legislatures and city councils stunted the jitney industry by eliminating most of the irresponsible drivers who could not get the necessary indemnity bonds and meet the other requirements imposed. The total number of jitney drivers was still further reduced by the general resuscitation of business. The revival of business and the advance of wages therein attracted the jitney driver, whose car was wearing out and who, therefore, was facing a period of lean earnings, back to his former employment. The death blow to the jitney, however, will be dealt not so much by legislation and restrictive municipal regulations as by the advance in the cost of gasoline and the higher price for tires. The jitneys will run in various places for months, and perhaps years, but the plague has run its course, and it is apparent to the careful, discerning investment banker who studies fundamental conditions that the electric railway industry has successfully passed through a trying period.

REMAINING DANGER OF UNFAIR USE IN STRIKES

In the long run, it is very likely that the real danger of the jitney will lie not so much in the undermining of electric railway earning power, as in its illicit and unfair use in connection with strikes and other labor problems. The situation now existing in Wilkes-Barre, Pa., bears directly upon the question. The Wilkes-Barre Railway about a year ago was presented with a demand from its men for an advance in wages. After negotiations, the matter was submitted to arbitration and a signed agreement was made between the company and the men providing that there would be no appeal from the findings of the arbitrators. Shortly thereafter, the arbitrators were appointed, held hearings and rendered a decision. The men were granted an advance in wages. The company accepted the award, paid the advanced wages from the date specified in the agreement and made current payments in connection with the award of the board of arbitrators.

The men, however, were not satisfied with the award, and appealed for a reopening of the entire controversy. The company pointed to the clause in the agreement which specified that the award should be final and not subject to appeal. Early last autumn, without any warning, the men went out on strike, and rioting and disorder prevailed for some weeks. The company has taken the position that it has faithfully observed its contract with the men and that it must insist that the men do likewise. For months a regular running schedule has been maintained in Wilkes-Barre, the cars being manned by local workmen. No disturbances or riots have occurred for many weeks, but anyone who visits Wilkes-Barre will be impressed by the fact that there is an organized and very effective boycott of the street cars.

Wilkes-Barre is situated in the heart of the hard coal field—the stronghold of the United Mine Workers

of America. Through the strong affiliations of the labor unions, a large proportion of the regular riders on the street cars have been deterred from using them. The boycott has been carried into every walk of life. If a baker rides on the car, he finds that his customers desert him and buy bread elsewhere. Bank cashiers have feared to use the trolleys because of the threat that the union men will withdraw their savings deposits. This situation, which has continued for more than eight months, is very sinister. Such long resistance would have been impossible were it not for the jitney. The town is overrun with cheap cars of every description, and accidents to vehicles and pedestrians have jumped alarmingly—in short, the whole story of jitney operation has been repeated. The operation of the jitney is made practicable through charging a higher fare to most sections of the city than the ordinary 5-cent rate of the street car. The jitney has been the backbone of the union's resistance in carrying on what might be termed a war of attrition.

The Wilkes-Barre situation is not an isolated example. Within the last month a strike occurred on the electric railway lines in Trenton, and there sprang up over night a swarm of jitneys which carried, in some fashion, those who were previously regular street car passengers.

The great force which has compelled the prompt settlement of labor disputes of electric railways in the past has been public sentiment. The public has been impatient with long delays. The discomfort of walking exceeded whatever zeal might exist for a fight to the finish between the utility and its employees. But the jitney, when used in connection with strikes, removes the reasons for pressure of public opinion. As it is, the struggle is overlong and now the public is invited to assist in its prolongation by adopting a substitute method of transportation.

THE MODEL DECISION IN ROCHESTER

The public service commissions of the various states must come to realize that the jitney should be reduced to its permanent and legitimate place. The most encouraging recent development has been the decision of the New York Public Service Commission, Second District, in the so-called Rochester case. This decision might well serve as a model for the action of every other public service commission. After pointing out that the policy of the public service commission laws of the State of New York is toward regulated monopolies, the commission in its opinion states that unrestricted competition between the electric railways and the jitney must, as has always been the case in the past, inevitably result in disaster to the competitors. In this disaster, the public has a paramount interest. The time is not yet ripe to abandon the electric railway as the standard means of transportation. Yet direct competition between the jitney and the electric railway would so reduce the revenues and the progress of the latter as to induce defective and inadequate service and so lead eventually to the death of the older means of transportation.

The commission asked the question, "What, then, is the proper function of the jitney?" In answer it said: "Except in cases where the existing street railways system obviously cannot or will not supply the reasonable requirements of a community, the use of jitneys, for the present at least, ought to be confined to streets and neighborhoods which now have no electric railway readily available." The commission refused the applications of jitney drivers for certificates of public convenience and necessity, and recommended certain extensions and improvements in the electric railway service which, if not made, might result in another application

for jitney operation meeting with more favorable consideration by the commission.

DETERRING INFLUENCES IN NEW FINANCING

Although the general tendency is for public utilities to search for new capital, there are certain deterring influences in connection with the financing of new construction, such, for example, as the very high prices now prevailing for material and labor of all kinds. With copper wire selling in the neighborhood of 32 cents a pound and with similar famine prices prevailing for other supplies, the cost of new construction is very great. Moreover, the situation of the electric railways as regards labor is far from satisfactory from the investor's standpoint. All labor is receiving unheard-of wages, and the supply is less than the demand. The unprecedented advance in wages in other industries must inevitably be reflected in demands of electric railway employees for higher wages. Inasmuch as about 60 per cent of the operating expenses of an electric railway are made up of payments for salaries and wages, the importance of the labor situation can be realized. Many investment bankers are more concerned at the present time about the labor aspect of the electric railway situation than they are with the jitney and with commission regulations.

Although under these circumstances utility managers are inclined to postpone all new construction until the return of more normal conditions, nevertheless the probable increased demand for service will necessitate additional cars, generating apparatus and the many other forms of property employed in the public service. To meet this demand, electric railways must of necessity secure new capital. It is reasonable to presume, therefore, that in the absence of some disturbing influence in the financial markets, directly or indirectly resulting from the European war, the electric railways should again appear as seekers for capital. Indeed, the movement has already begun.

Axle-Mounted Armatures

Discussion of the Master Mechanics' Report on Electric Locomotives Centered on the Influence of Axle-Mounted Armatures on the Track

IN LAST week's issue an abstract was published of the committee report on electric rolling stock which was made before the American Railway Master Mechanics' Association at Atlantic City, and in the following paragraphs the discussion on the report is presented in part.

The discussion was opened by C. H. Quereau, superintendent of electric equipment, New York Central Railroad, who said that this company is using on its electric locomotives what is known as the bi-polar gearless motor. The motor is mounted directly on the axle of the driving wheel, and the drivers can be dropped exactly as they are from the steam locomotive after the side and main rods have been removed. This type of motor is frequently considered not to be a good-riding design. However, it is thoroughly satisfactory under the conditions on the New York Central Lines and other trunk lines using a 100-lb. rail on a good roadbed. It is true that the locomotive develops a tendency toward nosing when a certain amount of lateral motion has accumulated, no matter where it may be—in the center, in the plates, or in the hub. Everyone will agree that the track man, the division engineer or the track foreman would be the first to criticise any device which did any damage to his track, yet it is the consensus of opinion among the track men on the New York Central Railroad in the territory in which the locomotives operate, that there has been no single case of deformation, distortion

or damage to the track from these motors. There is no difficulty at all in keeping the lateral motion in such condition that the engine rides literally like a parlor car. In fact, no other design rides so smoothly and quietly under the specified conditions of track. The lateral motion allowed is about three-quarters of what would be considered the limit for steam operation.

The simplicity of this design makes the maintenance cost very low. However, fear of gearing on electrical equipment is really unfounded. A common idea is that it wears out, breaks and makes all sorts of trouble. Nevertheless, the New York Central Railroad has gears on its motor cars, which have made 200,000 miles on 200-hp. motors. With the modern heat-treated steel, 300,000 miles at 30,000 miles a year may reasonably be expected, and then one can forget the gears and pinions and simply watch them once in a few years.

Mr. Quereau concluded his remarks by referring the delegates to an article on electric locomotive drives in the ELECTRIC RAILWAY JOURNAL for June 10, by F. H. Shepard. He was followed by Frank Rusch, Chicago, Milwaukee & St. Paul Railway, who stated that the operation of that company's electric division has been successful even beyond expectations.

G. W. Wildin, New York, New Haven & Hartford Railroad, then commented on the operation of locomotives of the geared type, saying that the New Haven has about sixteen switching locomotives with double pinions, one on each end of the armature, and solid gears on the drivers. In this case flexible gears would be much more satisfactory, because when one puts a new pinion on one end of the shaft, leaving the old pinion on the opposite end, the new pinion does the major portion of the work until it wears down and takes hold. However, with flexible gears a new pinion can be run with an old one without difficulty.

The New Haven has had a remarkable record as regards the operation of these sixteen switching locomotives, having gone for twenty-six months without detention to the switching service due to engine failures. The company is contemplating the purchase of twenty or thirty more with very little change as to size and construction, simply strengthening up a number of parts which were found to be a little weak in design, but nothing that is serious. The company also has thirty-six freight locomotives in operation between Harlem River Terminal and New Haven, a distance of about 65 miles. These are hauling 3000-ton trains, two locomotives being operated in multiple. There are about forty-seven passenger locomotives, and between shopping these locomotives cover about 110,000 miles, the cost having gradually come down so as to compare favorably with steam locomotives. These locomotives operate on both alternating and direct current, and trouble comes in changing from one system to the other, especially in the winter. When the engine passes from the third-rail to the overhead system, the pantograph is rather sluggish, and in the reverse direction the third-rail shoe fails to go down properly because snow and sleet accumulate on it.

Pending the issuance of special passes for various classes of employees and officers of the Kansas City (Mo.) Railway, all who ride on passes are using the aluminum badge which in the case of trainmen is attached to the front of the cap. Recently more than a dozen counterfeits of the badge were taken up, all bearing the same number, 399. The counterfeits were made of stiff glazed cardboard set in a tin rim and closely resembled the badges. The counterfeited number had been reported lost several months ago. When the new system of passes is in effect the general use of the badges will be abandoned.

B. J. Arnold Reports on Bay State Street Railway

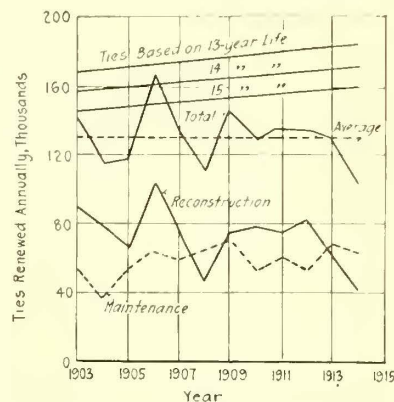
Transportation Expert Concludes That Economies in Operation Amounting to Nearly \$700,000 Per Year Can Be Attained, But That When All the Savings Estimated Are Considered, With an Adequate Depreciation Allowance, the Gross Revenue Cannot Return 5 Per Cent on the Property

AT the request of the board, Bion J. Arnold, consulting engineer, Chicago, has completed a general study of the Bay State Street Railway for the Massachusetts Public Service Commission in connection with the pending fare case of the company. The object of the investigation was to determine whether any material reduction in operating expenses could be effected. Mr. Arnold concludes that from \$618,000 to \$759,000 a year can be saved by resorting to various economies outlined below, but states that this saving will be insufficient to enable the company to pay 5 per cent upon the value of its present property if an adequate allowance is made for depreciation. The gross revenue must be increased if all the lines of the property are to be continued in operation, properly maintained and ultimately placed on a paying basis. The fullest co-operation was rendered Mr. Arnold by the officers of the company.

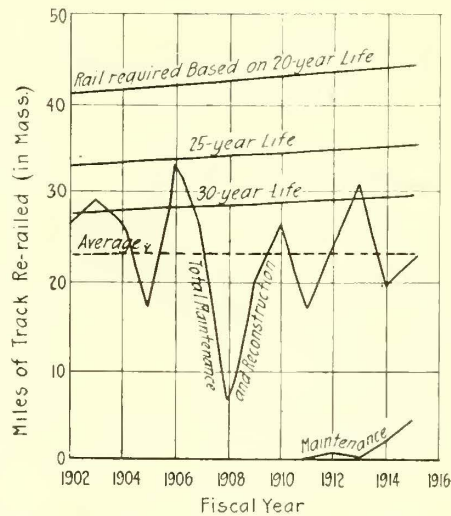
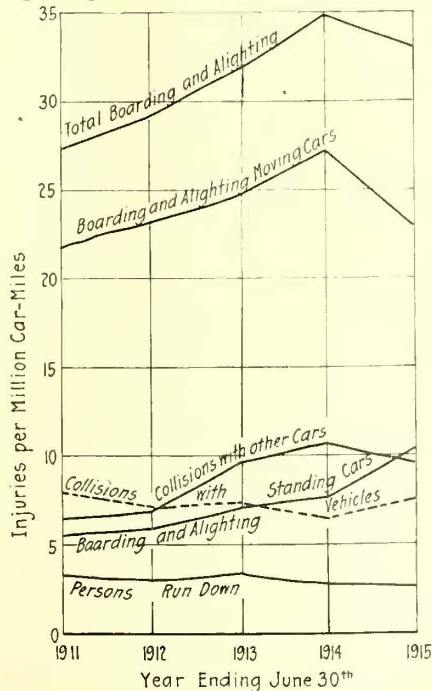
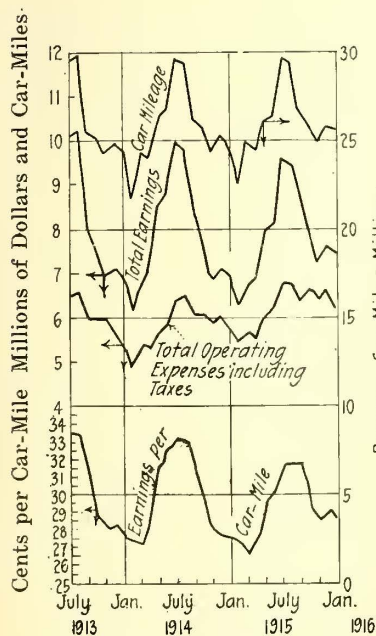
Some parts of the company's territory are served by a greater number of lines than the traffic warrants. Mr. Arnold finds that the riding habit is less between the various towns in eastern Massachusetts than in corresponding central or western areas. Keen steam railroad competition exists on the Bay State system, whose gross earnings per capita in 1915 were only \$7.02, or \$10,000 per mile of track. The average rate of interurban fare is also low on the Bay State system, being about 1.25 cents per passenger-mile, contrasted with 1.5 to 2 cents on Western interurban systems. The company operated 33,300 car-miles per mile of track in 1915, its service density being somewhat less than half that usually found in moderate-sized city systems, but perhaps twice that

of normal interurban service. The earnings per mile of track are less than half the normal for a city system of moderate size. The average return on the investment was 3.9 per cent in 1915. Since 1888 the average return has been only 5.3 per cent, and full provision has not been made for depreciation. Transportation revenue totalled 29.49 cents per car-mile in 1915, total operating expense, including taxes, being 24.07 cents. The latter compares with 16.4 cents in 1901.

A portion of the gradual increase in operating expenses per car-mile between 1901 and 1915 is attributable to an increase in weight of the average car of about 30 per cent, say from 13.5 to 17 tons. The whole study indicates that the expenses per car-mile are about 2 cents higher than might be anticipated. There is a 40 per cent seasonal variation in monthly earnings on the system. Track conditions in the cities and towns are in general very satisfactory, but a large amount of rehabilitation is needed on the so-called interurban lines. The report indicates a shortage in tie re-



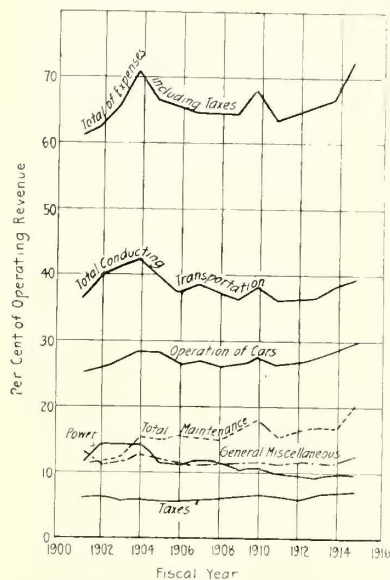
ARNOLD BAY STATE REPORT—RECORD OF TIE REPLACEMENTS



ARNOLD BAY STATE REPORT—SEASONAL VARIATIONS IN INCOME, ENTIRE SYSTEM; INJURIES IN TERMS OF CAR MILEAGE; RECORD OF RAIL REPLACEMENTS

newals of 144 miles of track in the past twelve years. About 150 miles of track should be rebuilt, including both rails and ties. The company has set up no depreciation reserve.

Mr. Arnold states that as long as the direct-current plants of the company (serving the lines north of Boston) are operated at their present efficiency it would appear that no decrease in cost of direct-current power delivered to the lines can be effected by abandoning them in favor of a more modern system when both operating expenses and additional interest charges are considered. The average operating cost of twelve direct-current stations in 1914 was



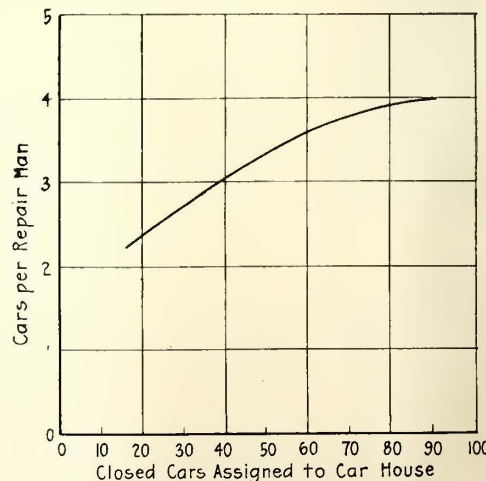
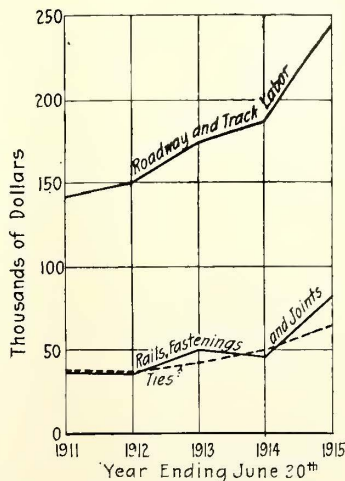
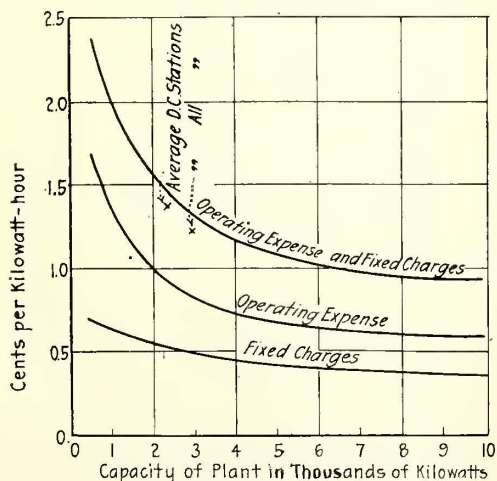
ARNOLD BAY STATE REPORT—OPERATING EXPENSES IN PER CENT OF REVENUE

transmission system amounts to 0.027 cent, or a total generating expense for transmission and conversion of 0.089 cent per kilowatt-hour. The corresponding fixed charges on the substation equipment and transmission system amount to 0.152 cent and 0.197 cent respectively, or a total of 0.349 cent, which, when added to the operating costs, gives a total of 0.438 cent. Taking all costs into consideration, the alternating current system generates, transmits, converts and delivers energy to the direct current substation buses at 1.538 cents per kilowatt-hour, estimating transmission and conversion losses at 16 per cent. The transmission voltage of 13,200 appears low for the distances involved.

It is probable that a material decrease in the power requirements can be secured by the installation of additional feeder capacity. Tests indicate an excess loss of about 14 per cent and on several lines the voltage is abnormally low. The addition of feeders costing \$850,000 would reduce the average direct-current transmission loss 10 or 12 per cent and save the company about \$85,000 a year.

The report discusses the company's rolling stock requirements in great detail, emphasizing the difficulties of standardizing cars for all the service requirements. If rapid transit entrance into Boston can be secured, and through interurban routes outside established, a distinctly new type of car should be developed. It would then be desirable to standardize equipment as far as possible along three lines: First, high-speed interurbans; second, large city equipment; third, light one-man cars, the two last named being prepayment and semi-convertible. Abandonment of open-bench car service is advisable. The drop steps recently installed on summer equipment have increased rather than decreased the menace from accidents and the difficulties of operation through congested streets, due to the increased width and overhang of the steps on curves. The new closed car is a good example of the usefulness of the convertible type. Outside of the Chelsea district the articulated type of car would be of no advantage to the company. The company's estimate for lengthening the old 25-ft. double-truck car bodies into a long double-truck body with a 10-ft. drop section, folding doors and steps, prepay, center entrance, is about \$1,200 or over per car, exclusive of overhauling and secondary accessories. Such a rebuilt car would seat thirty-six passengers. A new car body of similar class could probably be purchased for \$2,500. The application of trailers is also limited to the congested entrance into Boston.

The company has about sixty-seven carhouses to care for 2594 cars of all types. The number of cars per repairman varies from 2.9 in a thirty-six-car house to four in a ninety-car house. The report points out that the large number of houses is convenient to routes operated, but far from efficient from the standpoints of maintenance and inspection. Storing in larger houses and inspection and maintenance in larger groups is recommended. The need of adequate shop facilities is strongly set forth, in connection with comments upon the depreciated condition of the older rolling stock. With an outlay for proper facilities it is estimated that a saving of not less than \$100,000 a year could be effected in equipment maintenance. The use of open cars increases the cost of maintenance.



ARNOLD BAY STATE REPORT—COST OF POWER AT GENERATING STATIONS; COST OF MAINTENANCE OF TRACK AND ROADWAY; RELATIVE EFFICIENCY OF LARGE AND SMALL CARHOUSES

Considerable attention is paid in the report to the problems of car operation, emphasis being laid upon the severe handicap of the low schedule speed (8.35 m.p.h.). If this could be increased 10 per cent. to 9.2 m.p.h., the saving in platform wages would be about \$200,000 a year. Such an increase in speed could only be attained after the vast number of unnecessary stops on the system have been eliminated and the power supply bettered, and by making very radical changes in location of track, double-tracking, standardization of equipment by a more energetic handling of the cars by platform men. Slow speed is due in part to the location of lines in highways often hilly and crooked. Near-side stops are favored. Low acceleration and braking are also handicaps, as are the large amount of single-track line in use. The company lost 1798 car-hours by setbacks in a recent typical week.

At present a large number of lines are being operated with the longest practicable headway to provide any reasonable service and yet they are unprofitable. In such cases, particularly for short lines in suburban territory, the use of the one-man car is recommended during at least the greater part of the day. Such cars should be designed to be readily convertible into full-crew service for periods of heaviest traffic. It is probably not feasible to attempt the use of one-man cars on lines operating over tracks already carrying service on close headway on account of probable delay to the latter. From a group of sixteen to twenty-one low-earning routes it appeared that a saving of from 90,000 to 140,000 car-hours could be effected, or between \$25,000 and \$39,000.

It is estimated that a saving of from \$82,000 to \$133,000 per year can be attained by rearranging the car service to cut down over-service, etc. By concentration of carhouse work a saving of \$43,000 per year could be effected, in the author's opinion, and a saving of \$125,000 per year in general expenses is considered feasible by him.

Increased revenue appears to be possible from the use of prepayment cars, attraction of traffic through higher schedule speed, increase of interurban fares to 1.5 or 1.75 cents per mile, and more extended development of the express and freight business need of increased gross revenue is unquestionable.

Relations of the N. Y. E. R. A. to the Problems of the Industry

President of New York Electric Railway Association Shows Why Railway Operation Is Becoming Increasingly More Expensive

BY J. J. DEMPSEY

Superintendent of Elevated Transportation, Brooklyn Rapid Transit Company

IN his presidential address delivered before the New York Electric Railway Association at the Niagara Falls meeting this week, Mr. Dempsey, after referring to the history of the association since its organization in 1893, discussed the changes which have taken place in the meantime. He said in substance as follows:

The problem of obsolescence alone is one which assumes staggering proportions on any system where the growth of traffic has produced a demand for larger cars, larger units of power production and general increases in capacity of all other equipment. On the Brooklyn Rapid Transit system there are today seven power generating stations, the smallest of which used to produce about 4000 kw., while the largest today has a capacity of 126,000 kw. Three of the seven stations are now in operation, and one is in reserve. Three are unused, not

because they are worn out or even necessarily obsolete, but because the increased power demand has made them uneconomical as operating units. There is hardly an electric road operated which has not a similar condition. What is to be done with the capital honestly invested in facilities rendered obsolete by the advance in the art of transportation and the increasing demand for electric railway service?

At the same moment that we confront this question we also face the equally threatening problems of higher cost of labor and materials and the demand for lower fares or their equivalent in improved or extended service. At the same time the cost of public supervision is piling up. For example, the present system of reports required by the present commission of the Brooklyn Rapid Transit Company costs about \$20,000 per year more than that required by the previous commission.

To secure fair treatment for the electric railways, to secure for them half a chance to devote their energies to the solution of their problems, is the most important task confronting our association.

We have come to a political era when, to a large extent, the former control of legislation and public administration by party organizations has been done away with, and for it has been substituted a theory of direct responsibility of elected and appointed public officials to the public. The change came about through public indignation over the admitted evils of the old system. But is not the new condition producing evils quite as serious to those responsible for the use of capital invested in electric railways, to the security of the investment itself, and to the public?

In many instances officials refuse to be guided either by common sense or simple arithmetic in dealing with electric railway problems, because of some popular agitation based upon misunderstanding or misrepresentation. The public mind is open to any condemnatory or destructive idea but refuses to be interested in constructive undertakings.

Much of the agitation for decreased fares and extension of service beyond the economic possibilities of the case proceeds upon the theory that the capital involved cannot escape and can, therefore, be made to work for any or no return. What we must impress upon the public mind, and through it upon the official mind, is that while this may sometimes be true with capital already invested, no such condition exists in respect to the new capital which must be brought into the business.

The City of New York discovered that money is a free agent when it undertook to work out its rapid transit problem. Proceeding on the theory that a universal 5-cent fare and the extension of rapid transit into the outlying sections were necessary for proper city development, the city had ultimately to realize that the unprofitable operation involved could only be undertaken if supported by the credit and taxing power of the community. Accordingly the companies' investment was given priority over the city's investment because the city could raise money by taxation to pay interest which the operation of the system would not earn for years, whereas the companies could face such a contingency only with the sacrifice of credit and ultimate insolvency.

The relation between revenue and expenditure in the street railway business has about reached the breaking point. If the public, through its representatives, insists upon stretching it until it at last snaps, the public will in the end be the worst sufferer. It remains for our association to bring this fact home to the people of our communities. If we fail we can hardly expect anything but disaster for our joint enterprise. If we succeed, we shall be doing immeasurable service to the entire people of the State.

Electric Railways and Mobilization

An Army Officer and Railway Managers Present Concrete Plans for Electric Railway Co-operation in Military Mobilization at Annual Meeting of New York Electric Railway Association This Week—Other Topics Considered Included Standardization

THE thirty-fourth annual meeting of the New York Electric Railway Association was held in the International Hotel, Niagara Falls, on June 27 and 28, 1916. The principal topic was "The Electric Railways in National Defense." Two hundred members and guests were in attendance.

TUESDAY MORNING SESSION

President J. J. Dempsey, Brooklyn Rapid Transit Company, read an address on "The Relation of the Association to the Problems of the Industry" at the Tuesday morning session. This is abstracted elsewhere in the present issue. The Secretary-Treasurer, William F. Stanton, Schenectady Railway, in his annual report showed the association to be in a flourishing condition, with a growing membership and bank balance. The membership committee also reported a very satisfactory year's work, the following having joined during the year:

Active Members:

The Third Avenue Railway Company, New York.
Richmond Light and Railroad Company, New Brighton, N. Y.
Binghamton Railway Company, Binghamton, N. Y.
Glen Cove Railroad Company, Glen Cove, Long Island, N. Y.

Allied Members:

Railway Specialties Company, New York.
Electric Cable Company, New York.
Harry DeSteele, New York.
Cooper Heater Company, Carlisle, Pa.
More-Jones Brass & Metal Company, Philadelphia, Pa.
John W. Masury & Son, Brooklyn, N. Y.
Railway Improvement Company, New York.
The Q. & C. Company, New York.

The committee added that but one active member had resigned from the association during the year. This resignation was tendered not on account of any dissatisfaction with the association, but due to financial conditions, and with the promise that as soon as conditions permitted the company will again become a member.

Only three allied members had resigned. One company's resignation was tendered on account of its withdrawal from the manufacture of electric railway equipment, and another was due to a receivership. The third was for some unknown reason.

For the committee on workmen's compensation, J. P. Barnes, Buffalo, Lockport & Rochester Railway, presented a comprehensive report showing the status of compensation insurance in the state. This report will be abstracted later. In moving the acceptance of the report, Frank Hedley, Interborough Rapid Transit Company, asked for the continuation of the committee with the request that it investigate and report upon such injustices as have come about through the operation of the compensation act. He showed, for example, that a company could be held for compensation in case of death by suicide. He called attention also to the fact that ordinarily men with few dependents would be selected for hazardous jobs, but when labor was scarce this was impracticable and this imposed a hardship upon the employer.

In seconding Mr. Hedley's motion, E. A. Maher, Jr., Third Avenue Railway, New York, suggested that the committee investigate the relative treatment received by self-insurers and companies insured in the State fund, when compensation cases are being adjusted by the commission. Mr. Maher believed that employees should be held responsible for statements made in applying for employment, and gave an example of the effects of failure along this line. In the case cited a man had given false information as to name, previous employment and number of dependents. After four days' work he was killed and the employer has a widow and four children to take care of.



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DISCUSSION ON MOBILIZATION

Wilbur C. Fisk, Hudson & Manhattan Railroad, New York, next reported for a special committee which the president had appointed April 5, 1916, to study the movement of troops by electric lines, consisting of W. H. Collins, Fonda, Johnstown & Gloversville Railroad; J. E. Hewes, Albany Southern Railroad; J. P. Barnes, Buffalo, Lockport & Rochester Railway; George D. Snyder, Hudson & Manhattan Railroad, and himself, chairman. An abstract of this report appears elsewhere in the present issue. Following this, two papers which had been solicited by the committee were read. One was by J. E. Hewes, Albany Southern Railroad, on "The Advantage of Electric Traction in Time of War," read by himself. The other was by Col. J. B. Bellinger, U. S. A., on "The Use of Electric Railways in the Military Service," read in the author's absence by the secretary. Since he prepared the paper Colonel Bellinger had been assigned to important duties in the National Guard mobilization.

In the discussion of the subject, H. G. Grier, General Electric Company, told of experience in France where, in preparation for using an electric railway for military purposes, turnouts had been installed 15 in. below grade and buried. These had proved useful in the present war.

Mr. Hewes showed that the transportation conditions at the outbreak of the Spanish-American War were disgraceful, and illustrated this from personal experience. He stated that by filling two gaps of about 35 miles each, it would be possible to have a continuous electric railway from New York to Erie, which could be used to supplement the steam lines. The success of Germany and Austria in their drive against the Russians last year was due partly to the possession of transportation facilities, which the Russians lacked. Much of the fighting was done at points selected by the Germans and fortified, temporary electric railways being used to bring up ammunition.

Mr. Barnes said that this general subject has been considered for some months. Electric railways have

interesting transportation problems not yet generally recognized. While long moves must be handled by the steam lines, in the collection of individual units the electric railway has an important place. Its organization is such that the work of handling troops could be accomplished like snow fighting. Only a pre-arranged organization and signal are necessary. Snow fighting is part of the everyday business of the electric railway—there is nothing novel about it.

Mr. Barnes also pointed out that the handling of small units prepares electric railway men to do the same on the state railways and roads. Systems of dispatching, telephone stations, etc., could easily be arranged. These men could work in on a system to utilize their own equipment and the state highways effectively. All that is required is a preliminary study to show what must be done in time of emergency.

In closing the discussion Mr. Barnes offered the following resolution, which was passed enthusiastically: "That a committee of five on military service be appointed with instructions to study the problem of military service in New York State, co-operating with the military authorities of the State and the United States in the preparation of plans for movements of troops, munitions and supplies."

ON THE NON-USE OF A. E. R. A. STANDARDS

On behalf of the American Association committee on the use of association standards, W. G. Gove, Brooklyn Rapid Transit Company, made a plea for more attention to the work of the standards committee. A committee had been appointed at Mr. Gove's suggestion to answer the question as to why the standards are not more generally used. The trouble, he said, may be with the manner in which the standards are prepared or with the member companies which pay the expenses of the committees but are not willing to utilize the results of their work.

Among the reasons for the wider use of standards Mr. Gove called attention to the large stocks of supplies required with few standards, and to the space needed in storing these stocks. Each year new parts are being added to the stock lists. The manufacturers are glad to



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MEMBERS OF NEW YORK ELECTRIC RAILWAY ASSOCIATION IN ATTENDANCE AT NIAGARA FALLS CONVENTION

co-operate in this work, but the initiative seems lacking. Certain standards already adopted have proved of value to purchaser and manufacturer, and none is effective without the approval of the latter. The tendency toward standardization results in scientific investment.

To illustrate how the standards are not being used, Mr. Gove cited the case of the standard rail, of which but 10,000 tons have been rolled. On the other hand, wheel standards have been of great use to electric railways. While he did not believe in the unqualified use of standards, many of them could be used, for example, wheels and axles. The average railway is not making an effort to furnish its technical staff with information regarding the standards.

Mr. Gove also said a good word for the Engineering Manual, and suggested that the distribution of revisions of the Manual should be simplified and cheapened.

Mr. Barnes supported Mr. Gove, stating that he knew from experience how carefully these standards are prepared. Each has real work behind it, and competent criticism has been secured in formulating it. While the standards need not always be adopted, they should always be considered. The New York State Association formerly paid much attention to standards, but had not done much lately. He moved the appointment of a committee to study the subject, and such was ordered.

J. H. Pardee, J. G. White Management Corporation, said that standards are not adopted because engineers do not agree. The Pennsylvania Railroad would not adopt New York Central standards. The committee should not be discouraged, and the New York Association committee should co-operate with the national association.

Mr. Gove said further that the method of standards exploitation was at fault. The money available for committee activity was limited. Further, in appointing a committee qualifications rather than geographical location should govern. Standardization must be approached in a broad way, and standards cannot be adopted wholesale. The companies must look for return from committee work and abandon their apathetic attitude toward standards.

Mr. Pardee amplified his earlier statements by stating that the adoption of standards, while one test of their quality, is not the only test. They produce results even if not actually adopted.

In closing the discussion Mr. Dempsey said that Mr. Gove's suggestions would be followed in the appointment of the committee. He also announced as the nominating committee, Messrs. Pardee, Hedley, W. H. Collins, Fonda, Johnstown & Gloversville Railroad, and James F. Hamilton, Schenectady Railway.

WEDNESDAY MORNING SESSION

On Wednesday, June 28, a short business session was held in the morning. The committee on nominations presented the names of the following men for the offices named, and they were unanimously elected: For president, James P. Barnes, general manager Buffalo, Lockport & Rochester Railway, Rochester; for vice-presidents, Wilbur C. Fisk, president Hudson & Manhattan Railroad, New York, and C. F. Hewitt, general manager United Traction Company, Albany; for secretary-treasurer, William F. Stanton, assistant to the general manager Schenectady Railway; for members of the executive committee, E. J. Dickson, vice-president International Railway, Buffalo; James E. Hewes, general manager Albany Southern Railroad, Albany; E. A. Maher, Jr., assistant general manager Third Avenue Railway, New York; and W. O. Wood, president New York & Queens County Railway, Long Island City.

Mr. Barnes was then escorted to the chair by a committee, and in a few fitting words accepted the honor and responsibility laid upon him by the association.

On motion of W. H. Collins, Fonda, Johnstown & Gloversville Railroad, resolutions were passed paying tribute to the memory of the late W. B. Rockwell, formerly an active member of the association. Resolutions of thanks to those responsible for the success of the meeting were also passed. W. O. Wood suggested that the members follow the jitney situation, urging upon their respective assemblymen the desirability of enacting regulatory measures.

THE BANQUET

The general topic of the banquet held on Tuesday evening, June 27, was "Preparedness." Mr. Dempsey acted as toastmaster and introduced successively O. E. Carr, city manager Niagara Falls; James H. Callanan, editor Schenectady *Union-Star*, and Dudley Field Malone, Collector of the Port of New York.

Mr. Carr, on behalf of the Mayor of Niagara Falls, welcomed the visitors and reminded them of the extent to which Niagara power is used for car propulsion.

Mr. Callanan, after defining the newspaper as the greatest charity organization in the country, complimented the railways upon their humanitarian work in reducing accidents, especially of the boarding and alighting type. The importance of this work is now generally recognized. He then took up the topic "Leadership and Demagoguery," defining the demagogue as "one who can entertain a crowd without letting it know what he thinks," and the "high-brow" as "one educated beyond his capacity." His idea was that "the middleman of poise makes for the world's best progress," and that "the umpire is the type of man needed, for he makes his decisions upon the merits of the case." He then applied these principles to the need for a large navy and to the Mexican situation.

Mr. Malone told some dialect stories in an inimitable fashion and then launched into the general subject of the evening's discussion. In this connection he said that first of all there must be preparedness in spirit. We cannot achieve a patriotic spirit among the great mass of working people unless we are willing to do social service of an honorable and practical kind. Mr. Malone also indorsed the spirit behind citizens' training camps, such as that at Plattsburgh, where he had had experience last year.

OTHER ENTERTAINMENT

The members were delightfully entertained during the meeting under the guidance of a committee headed by H. N. Ransom, Westinghouse Electric & Manufacturing Company, New York. Music for the banquet and dancing was provided liberally and golfing, luncheons, and pleasure trips filled in all of the time of the ladies and the spare time of the men.

Electric Railways in Military Service*

BY COL. J. B. BELLINGER, U.S.A.

Every citizen of a country owes a duty to his country, and every citizen of a country is entitled to be furnished by his country with the facilities for performing that duty. It is because of my belief in the obligation and right of every citizen to render service of some kind to his country that I permitted myself to be beguiled into indicating to your organization, in a general manner, the use to which electric railways might be placed in the military service. This paper must not be construed as being intended to indicate a solution of the general problem of the use of electric railways in the military service. The details of their

*Copyright, 1916, by Col. J. B. Bellinger. Abstract of a paper.

organization for this purpose is, to my mind, a function of the federal government in the solution of the general problem of preparing the country for its proper development and for its protection from harm, internal or external.

After a personal experience with military transportation problems which were large at that time, though they sink into microscopic insignificance when compared with the problems of military transportation which have developed and have been solved during the past two years in Europe, I evolved an expression the correctness of which has certainly been proved by recent events in Europe. It is that transportation is the keystone to the arch, both military and civil. With the application of this principle always in mind, all transportation facilities in a country should be organized so as to insure their rendering the maximum obtainable results.

Of the many forms of transportation which exist, electric railways are most important, but, for military purposes, they will always render their maximum results as auxiliaries. This fact is due to the location of their lines and to the amount and class of equipment necessary for performing the daily service for which they are constructed.

The urban railways can render great service, particularly in large cities, in moving troops, constabulary forces and citizens' municipal protective organizations, readily and rapidly to points of local disorder, as well as to points from which they would be moved for concentration at other points beyond the limits of the municipalities. They can also be used for the transportation of supplies and material between localities within the municipality at which they are to be used and to points therein from which they are to be transported beyond the limits of the municipality. It is believed, however, that the use of urban electric railways for the transporting of supplies would not be as effective as motor trucks, due to their lack of flexibility, but that they would be most effective for the rapid movement of troops about the city.

Rural electric railways can be most effectively and efficiently utilized as auxiliaries to steam railways on the one hand, and to motor truck, animal transportation and marching on the other hand. In other words, the use of the interurban electric railways for military transportation service falls between the use of the steam railway which can transport personnel and material in large quantities per trainload for great distances and the use of the motor truck, animal transport and marching which would transport personnel and material in smaller quantities for shorter distances.

Where existing trolley lines have physical connection for passing the cars from one line to another and thus obtaining a continuous movement without transfer of passengers and freight, their military effectiveness is increased until the maximum effectiveness is reached for any locality. The maximum distance over which they can be used efficiently is determined by the number of men or quantity of supplies which can be handled per car or per train over this distance in some unit of time fixed by the necessity of the occasion.

Just as troops in and about Paris are reported to have been moved by motorbuses, motor trucks and automobiles to reinforce the troops of the Allies which were falling back before Von Kluck's army, so rural electric railways could be utilized for transporting troops and supplies between points along their lines.

DEVELOPMENT OF LINES

In order that the federal government may at all times obtain for military service, in peace or in war, the maximum effective results from the electrical railway sys-

tems now existing or which may be built in the future, I recommend that your association form a committee to be known as the Committee on Military Service, whose duty it will be to make a careful study of the location and equipment of the roads represented by this association, formulate plans for constructing lines, as soon as it is considered that they will be paying commercial enterprises, to fill in the gaps which may now exist between lines and obtain continuous movement between extreme points of the lines thus connected and for standardizing the equipment as the present equipment is replaced.

The passenger cars of this standard equipment should, if practicable, be arranged on the basis of transporting complete units or complete fractional parts of units. For example, a war strength company of infantry being 150 men, the standard passenger coach should be able to seat fifty-five or eighty persons, thus making one-third or one-half of an infantry company with the equipment carried on the person of the soldier, in each coach.

Stock cars should carry twenty animals, which would be five four-mule teams.

Flat cars should carry two escort wagons or two ambulances or a field gun, limber and caisson.

The minimum capacity of the baggage cars should be the field equipment of a battalion of infantry, and the maximum should be whatever might be determined to be best for commercial purposes.

A standard of equipment having been established and a definite plan for development of new lines having been agreed upon, the railways should work toward the execution of these standards and plans on the basis of obtaining a proper return on the investment from commercial business as the government of the United States has not yet reached the point of developing the industries of the country by government aid because of the government's ultimate need of the industry.

PURPOSES OF COMMITTEE ON MILITARY SERVICE

Assuming the organization of the Committee on Military Service to have been made, this committee should, at the same time that it is working on the questions of the further construction of lines and the standardization of equipment of the members of this organization, plan to have this organization communicate with similar organizations throughout the country with a view of having each of the organizations creating similar committees on military service.

Assuming that every association of this character in the country has established a committee on military service, these committees should form from their membership a general committee on military service which should represent all of the electric railway associations throughout the country, and the work of this general committee should be that of co-ordinating the building of new lines and the standardization of new equipment, on the basis previously indicated, throughout the entire country.

It should also be the business of this general committee to focus the power of the electric railway associations throughout the country in such a manner on the authorities of the federal government as to insure their aiding the accomplishment of the proper development of the electric railways throughout the country in a manner which will result in service from them for the benefit of the federal government.

It must be thoroughly understood that the efforts of the individuals and of the organizations throughout the country to place themselves and their facilities at the disposal of the federal government can never effectively materialize until the federal government through its agencies co-ordinates the efforts of the individuals and

of the organizations in such manner as to obtain the benefit of their accumulative effort.

When the federal government finally realizes the importance to the country of seriously undertaking this problem of mobilizing the industrial resources of the country, it will obtain maximum efficiency only by utilizing the personnel of the industries as federal agents when the government takes over the control of the industry for its needs.

For example, the personnel of every industry would be organized in such a manner as to continue the transaction of its business under its own officials who would become local federal officials working under a centrally located permanent federal official, who would simply indicate to the proper local federal official of the federalized industrial personnel what was to be accomplished and when. The details of accomplishment would be executed under the immediate direction of the federalized officials of the industry previously vested with the execution of the orders of the permanent federal official.

ELECTRIC RAILWAYS USED FOR MILITARY SERVICE

It will probably interest you to know that I have personally had occasion to utilize, in a small but most effective way, electric railways for military transportation. I will cite the cases.

In May and June, 1898, I personally suggested the use of the electric railway at Tampa, Fla., for military transport and succeeded in having the electric railway officials there use their road most effectively for the military service. The siege artillery camp was on the hills in the vicinity of Ybor City, Fla., and to reach the camp by wagon road necessitated the hauling of heavy siege pieces through very deep sand. Large Percheron horses had been supplied for drawing these siege pieces, but these animals refused to pull the pieces through the sand. This difficulty was promptly overcome by placing mules on the work, which was then performed but in too slow and inconvenient a manner. I then arranged with the electric railway officials to make physical connection with the steam railroad track and use their electric cars to pull the railroad freight cars containing the heavy gun equipment over their tracks to the artillery camp, where we built an unloading platform for handling it from the cars.

Soon after reporting for duty at Governor's Island in April, 1912, General Fred Grant died, and his funeral escort was concentrated at the Battery to march from there to West Forty-second Street Ferry and then to be returned to their posts. These troops were taken from Governor's Island, Fort Wadsworth, S. I., Fort Hancock at Sandy Hook, N. J., Fort Hamilton in Brooklyn and Fort Totten at Whitestone, L. I.

The concentration of these troops at the Battery in New York City and the returning of them to their posts after the cortège had reached the foot of West Forty-second Street was worked out by me so as to use the electric railways to their maximum as auxiliaries to the steamboat service which it was necessary to use in concentrating the troops at the Battery.

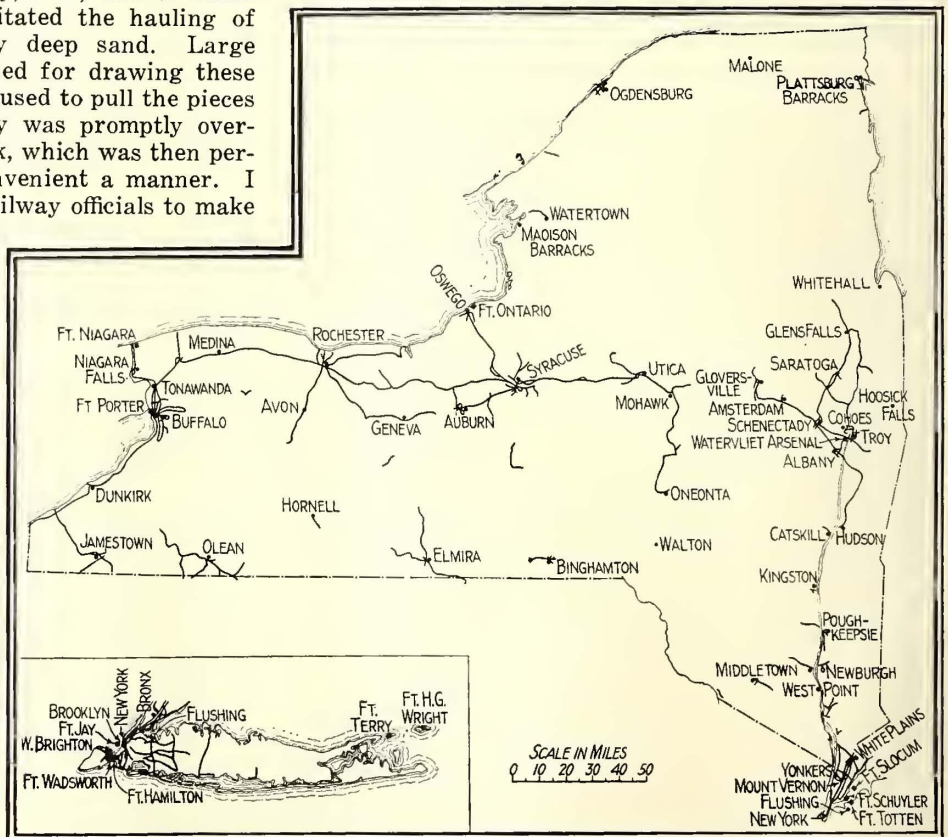
The troops at Fort Hamilton were brought by marching and electric railway to Thirty-ninth Street Ferry, Brooklyn, and by it brought over to New York City. Those from Fort Totten, Fort Hancock, Fort Wadsworth and Governor's Island were brought to New York City by boat.

The Governor's Island troops were returned by the Ninth Avenue Elevated Railway to South Ferry and by ferryboat to Governor's Island. The Fort Hamilton troops were returned by the Ninth Avenue Elevated to South Ferry, by Thirty-ninth Street Ferry to Brooklyn, and then by electric railway to a point as near as possible to the post of Fort Hamilton. The Fort Hancock and Fort Wadsworth troops were returned by boat from the pier at West Forty-fifth Street, and the Fort Totten troops by boat on the East River after marching across town.

In closing, I strongly recommend that you "get busy," for everything that you do in the way of organizing on the general lines indicated will be primarily for the benefit of our country and secondarily for the benefit of your properties.

Report of Committee on Movement of Troops

The report of this special committee, referred to elsewhere in the running report of the association meeting, comprised a résumé of the committee's work and appendices containing data of the equipment of railways, location and sizes of companies making up the several regiments, etc.



ELECTRIC LINES AND TROOP STATIONS IN NEW YORK IN 1916

From Maj.-Gen. John F. O'Ryan data as to the peace and war strengths of the State Guard were secured and with these as a basis maps and tables were prepared. Appendix I of the report is reproduced as Table I herewith, and the accompanying map, also from the report, shows the locations of the National Guard centers re-

Table I—Data Regarding the N. G. N. Y. and the Electric Railways

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WAR FOOTING

Organization	Location	Men	VEHICLES		ANIMALS		Baggage, Lbs.	ELECTRIC RAILWAY SERVING LOCALITY
			Number	Weight, Lbs.	Number	Weight, Lbs.		
Headquarters Division	New York City	27	3	6,120	37	43,055	1,000	Brooklyn Rapid Transit, Interborough Rapid Transit, Hudson & Manhattan Railroad,
1st Battalion, Signal Corps	1 Co. Brooklyn	176	14	22,400	208	244,987	6,000	Brooklyn Rapid Transit, Interborough Rapid Transit, Hudson & Manhattan Railroad.
22nd Corps of Engineers	1 Co. Manhattan New York City							
	1 Pioneer Batt. 4 Co.	682	12	19,200	193	22,000	4,000	Interborough Rapid Transit.
	1 Pontoon Batt. 4 Co.	682	137	595,104	845	990,000	4,000	Interborough Rapid Transit.
1st Cavalry	Hdq., 5 troops, Brooklyn	585	16	32,640	707	815,252	5,600	Brooklyn Rapid Transit.
	1 troop, Albany	103	1	2,040	104	120,274	800	Albany Southern (All), United Traction (Men and Baggage).
	1 troop, Syracuse	103	1	2,040	104	120,274	800	N. Y. State Railways, Empire United Railways.
	1 troop, West Brighton	103	1	2,040	104	120,274	800	N. Y. State Railways.
	1 troop, Utica	103	1	2,040	104	120,274	800	N. Y. State Railways.
	1 troop, Rochester	103	1	2,040	104	120,274	800	N. Y. State Railways.
	1 troop, Buffalo	103	1	2,040	104	120,274	800	International Railway.
	1 troop, Ashantee (Avon)	103	1	2,040	104	120,274	800	Eric Railroad (All).
		1306	23	46,920	1435	1,657,170	11,200	
Squadron "A"	New York—Headquarters							
	4 troops, M. G. T.	488	4	8,160	553	619,251	4,000	Interborough Rapid Transit.
1st Field Artillery	Headquarters—New York							
	4 batteries, New York	842	162	258,888	792	928,374	5,000	Interborough Rapid Transit.
	1 battery, Syracuse	176	37	59,422	157	204,035	1,000	New York State Railways.
	1 battery, Binghamton	176	37	59,422	157	204,035	1,000	Binghamton Railway
2nd Field Artillery	Headquarters—Brooklyn							
	3 batteries, Brooklyn	644	123	191,216	611	755,879	4,000	Brooklyn Rapid Transit
	3 batteries, Bronx	550	113	186,616	495	580,565	3,000	Interborough Rapid Transit.
Armored Motor Battalion	New York	100						Interborough Rapid Transit.
8th Coast Defense	11 Cos., New York	1753	20	40,200	157	160,040	12,000	Interborough Rapid Transit.
9th Coast Defense	10 Cos., New York	1600	19	38,160	153	155,316	12,000	Interborough Rapid Transit, Hudson & Manhattan R. R.
13th Coast Defense	12 Cos., Brooklyn	1906	21	42,840	161	164,764	14,000	Brooklyn Rapid Transit.
1st Infantry	Hdq., 1 Co., Binghamton	232	11	22,440	143	128,544	3,000	Binghamton Railway
	2 Cos., Utica	306	2	4,080	8	9,448	2,000	New York State Railways.
	1 Co., Watertown	153	1	2,040	4	4,724	1,000	Black River Traction.
	1 Co., Ogdensburg	153	1	2,040	4	4,724	1,000	Ogdensburg Street Railway.
	2 Cos., Newburg	306	2	4,080	8	9,448	2,000	Orange County Traction Company.
	1 Co., Walton	153	1	2,040	4	4,724	1,000	
	1 Co., Oneonta	153	1	2,040	4	4,724	1,000	Otsego & Herkimer (All).
	1 Co., Middletown	153	1	2,040	4	4,724	1,000	Walkkill Transit.
	1 Co., Malone	153	1	2,040	4	4,724	1,000	
	1 Co., Mohawk	153	1	2,040	4	4,724	1,000	Otsego & Herkimer (All), N. Y. State Railways.
2nd Infantry	Hdq., 3 Cos., Troy	538	13	26,520	151	137,942	5,000	United Traction (Men and Baggage).
	1 Co., Cohoes	153	1	2,040	4	4,724	1,000	United Traction (Men and Baggage).
	2 Cos., Schenectady	306	2	4,080	8	9,448	2,000	Schenectady Railway.
	1 Co., Gloversville	153	1	2,040	4	4,794	1,000	Fonda, Johnstown & Gloversville Railway (All).
	1 Co., Amsterdam	153	1	2,040	4	4,794	1,000	Fonda, Johnstown & Gloversville Railway (All).
	1 Co., Whitehall	153	1	2,040	4	4,794	1,000	Hudson Valley.
	1 Co., Glens Falls	153	1	2,040	4	4,794	1,000	Hudson Valley, Schenectady Ry.
	1 Co., Saratoga	153	1	2,040	4	4,794	1,000	Berkshire Street Railway.
	1 Co., Hoosic Falls	153	1	2,040	4	4,794	1,000	Berkshire Street Railway.
3rd Infantry	Hdq., 3 Cos., Rochester	538	13	26,520	151	137,992	5,000	New York State Railways.
	1 Co., Geneva	153	1	2,040	4	4,724	1,000	Geneva, Seneca Falls & Auburn and N. Y. State Railways.
	1 Co., Syracuse	153	1	2,040	4	4,724	1,000	N. Y. State Railways and Empire United Railways.
	1 Co., Oswego	153	1	2,040	4	4,724	1,000	Empire United Railways.
	1 Co., Niagara Falls	153	1	2,040	4	4,724	1,000	International Railway.
	1 Co., Medina	153	1	2,040	4	4,724	1,000	Buffalo, Lockport and Rochester Railway.
	1 Co., Olean	153	1	2,040	4	4,724	1,000	Western New York and Pennsylvania Traction.
	1 Co., Hornell	153	1	2,040	4	4,724	1,000	Hornell Traction.
	1 Co., Elmira	153	1	2,040	4	4,724	1,000	Elmira & Seneca Lake, Elmira, Corning and Waverly.
	1 Co., Auhurn	153	1	2,040	4	4,724	1,000	Auhurn & Syracuse Railway, Empire United Railways.
7th Infantry	New York City	1915	22	44,880	187	180,508	14,000	Interborough Rapid Transit, Hudson & Manhattan Railroad.
10th Infantry	Hdq., 4 Cos., Albany	691	14	28,560	139	142,716	6,000	Albany Southern (All), United Traction (Men and Baggage).
	1 Co., Catskill	153	1	2,040	4	4,724	1,000	Catskill Traction.
	1 Co., Hudson	153	1	2,040	4	4,724	1,000	Albany Southern (All).
	1 Co., Yonkers	153	1	2,040	4	4,724	1,000	Yonkers Railroad.
	1 Co., Mt. Vernon	153	1	2,040	4	4,724	1,000	Westchester Street Railroad.
	1 Co., Flushing	153	1	2,040	4	4,724	1,000	Long Island Railroad.
	1 Co., Poughkeepsie	153	1	2,040	4	4,724	1,000	Poughkeepsie City & Wappingers Falls Electric Ry.
	1 Co., White Plains	153	1	2,040	4	4,724	1,000	N. Y., Westchester & Boston, Westchester Street R. R.
	1 Co., Kingston	153	1	2,040	4	4,724	1,000	Kingston Consolidated R. R.
12th Infantry	New York City	1915	22	44,880	187	180,508	14,000	Interborough Rapid Transit, Hudson & Manhattan R. R.
14th Infantry	Brooklyn	1915	22	44,880	187	180,508	14,000	Brooklyn Rapid Transit
23rd Infantry	Brooklyn	1915	22	44,880	187	180,508	14,000	Brooklyn Rapid Transit.
47th Infantry	Brooklyn	1915	22	44,880	187	180,508	14,000	Brooklyn Rapid Transit.
65th Infantry	Hdq., 11 Cos., Buffalo	1762	21	42,840	183	175,784	13,000	International Railway
	1 Co., Jamestown	153	1	2,040	4	4,724	1,000	Chautauqua Traction.
69th Infantry	New York	1915	22	44,880	187	180,508	14,000	Interborough Rapid Transit, Hudson & Manhattan Railroad.
71st Infantry	New York	1915	22	44,880	187	180,508	14,000	Interborough Rapid Transit, Hudson & Manhattan R. R.
74th Infantry	Hdq., 11 Cos., Buffalo	1762	21	42,840	183	175,784	13,000	International Railway.
	1 Co., Tonawanda	153	1	2,040	4	4,724	1,000	International Railway.
1st Field Hosp.	New York	73	8	16,320	48	56,272	16,593	Interborough Rapid Transit, Hudson & Manhattan R. R.
2nd Field Hosp.	Albany	73	8	16,320	48	56,272	16,593	Albany Southern (All), United Traction (Men and Baggage).
1st Ambulance Co.	Binghamton	84	15	25,620	82	95,598	4,223	Binghamton Railway.
2nd Ambulance Co.	Rochester	84	15	25,620	82	95,598	4,223	N. Y. State Railways.
3rd Ambulance Co.	New York	84	15	25,620	82	95,598	4,223	Interborough Rapid Transit, Hudson & Manhattan R. R.
4th Ambulance Co.	Syracuse	84	15	25,620	82	95,598	4,223	N. Y. State Railways, Empire United Railways.
1st Brigade	Hdq., New York	15	1	2,040	16	18,584	1,000	Interborough Rapid Transit, Hudson & Manhattan R. R.
2nd Brigade	Hdq., Brooklyn	15	1	2,040	16	18,584	1,000	Brooklyn Rapid Transit.
3rd Brigade	Hdq., Albany	15	1	2,040	16	18,584	1,000	United Traction and Albany Southern.
4th Brigade	Hdq., Buffalo	15	1	2,040	16	18,584	1,000	International Railway.

ferred to in Table I, together with the traction lines mentioned. On the original map some of the troops data given in the table were shown also.

Appendix II of the report contained data of regimental concentration. Sample data from this appendix are given in Table II for the purpose of indicating their nature and the form of presentation. The tables showed that of the 18,700 troops in the State, but 1270 cannot be moved from their home stations by electric lines, although local electric railway service exists at all of these stations.

The committee found that the function of the electric railways is supplemental to that of the steam railways in the following particulars:

1. In the event of sudden mobilization the electric railways can assist in bringing individual soldiers from their homes or places of business to the armories, and when such a call comes at night on lines where an all-night service is not maintained, such lines can readily arrange to continue service during the night.

TABLE II—REGIMENTAL CONCENTRATION, INFANTRY, N. G. N. Y.
(SAMPLE ENTRIES)

1st Regiment		
Headquarters, Binghamton		
Cos. A and B, Utica.	Co. C, Watertown	Co. D, Ogdensburg
Cos. E and L, Newburg	Co. F, Walton	Co. G, Oneonta
Co. H, Binghamton	Co. I, Middletown	Co. K, Malone
	Co. M, Mohawk	

Cos. A and B (Utica), M (Mohawk) and G (Oneonta) can be concentrated by using the Otsego & Herkimer Railroad and the New York State Railways.

2nd Regiment		
Headquarters, Troy		
Cos. A, C and D, Troy	Co. B, Cohoes	Cos. E and F, Schenectady
Co. G, Gloversville	Co. H, Amsterdam	Co. I, Whitehall
Co. K, Glens Falls	Co. L, Saratoga	Co. M, Hoosic Falls

All the companies, with the exception of Co. I (Whitehall) and Co. M (Hoosic Falls), can be concentrated by the various electric railways, etc.

2. To assist in assembling the different elements of a command in cases where they are stationed at different points, so that the complete organization can entrain at one point for a concentration camp or other destination. The companies of some regiments are stationed at widely separated points and the electric roads can in many cases advantageously transport these elements to a central point.

3. To transport troops within the larger cities; from armories to steam railway terminals, or from armories to strategic points in case of riot or disorder; or from armories to suburbs or open country for maneuvers or field training.

4. As alternate or supplemental routes when the steam railways are temporarily blocked or disabled, or congested with other more important business, such as munitions, food or supplies.

As most of the electric lines are primarily passenger railroads, the problem of transporting the vehicles, animals and bulky equipment cannot be solved in all cases. The committee, therefore, collected data showing the rolling stock, capacity, running time, etc., on a number of roads in the State and arranged these in tabular form. In concluding its report the committee said as follows:

"The training and organization of the staffs of the electric lines are such that they can assist in the movement of troops even when these are not moved over their lines; for instance, in the regular loading and dispatching of motor cars from terminal points.

"The attention of the military authorities of the nation and the State is called to the fact that the electric railway officers are always ready to confer and co-operate with them in peace or war to further the development of the country's defensive power, as it is felt that the resources in men and material of these transportation lines are elements that will assist greatly in the solution of the problem."

Use of Electric Traction in Time of War

In introducing the discussion on this subject, James E. Hewes, Albany Southern Railroad, presented a paper prepared as part of the program of the special committee appointed to study the movement of troops by electric lines. Mr. Hewes had been an officer in the engineering department of the United States Army during the Spanish-American war, and he first gave a résumé of the transportation conditions during that period. In stating the position of the New York Association he said: "We as members of the New York Electric Railway Association desire to place ourselves in a position before the government as being willing to co-operate with the government in order to offer what facilities we have in time of war. To that end we must lay before the government some definite plan pointing out clearly just how far we can be of service and by what specific methods." Continuing, he said in part as follows:

"I hope that this move on our part may lead to further development of present electric railway systems, which development has been sadly lacking in the past few years, and that a way may be found by which the missing links now existing between the terminals of our interurban lines may be supplied. This will result in more rapid development and may be the means of enabling us to reorganize our present systems into larger units.

"The government and the State are liberally encouraging the development of State roads. Commissions have been appointed to consider the increasing of the strength of bridges on these roads, as many of them cannot sustain loads of 10 tons. The average electric railway bridges can support loaded cars equal in weight to steam equipment, and this is one facility which we can offer the government in the transportation of heavy loads."

Mr. Hewes then gave the results of study of conditions during the present war in Europe, showing that transportation has had much to do with the successes in several campaigns. He said that the German trenches are supplied by means of electric railways, having their bases at the nearest points of contact with a steam railroad. In some cases the electric road was merely a narrow tramway made up of sections using steel ties. All structural features of the tramway were supplied from the steam road base. Electric lighting in the trenches and current for searchlights were supplied from the source of supply of the electric road. He then went into details concerning the military features of the situation with a view to impressing the problems imposed by the transportation of vast quantities of ammunition.

Applying the results of his study to the immediate problem in hand, Mr. Hewes said:

"When vast bodies of troops and supplies are moving it is necessary, in order to avoid confusion, to have a complete system of dispatching. Highways and railroads can be controlled by men having railroad experience. It is quite within our power to lend valuable aid in this way.

"During the Civil War railroad men were appointed to handle the movement of troops, not as officers, but as dispatchers, and railroad men were appointed to take charge of the movement of troops on the steam roads. At times the Pennsylvania and B. & O. systems were turned over to and operated by the government, the operation being under the direction of railroad men.

"The value of electric railway facilities lies, first, in the personnel, our men who are capable of dispatching transportation. Second, an electric road can be built over an irregular country where grades that a steam

locomotive cannot surmount can be negotiated. Third, we have a vast number of cars with standard equipment that can be placed in service on short notice. Fourth, the electric road is not handicapped by the necessity of transporting coal and water as is the steam road. It is only necessary for us to put up a trolley wire and the source of energy supply is established. Fifth, there are probably more electric car crews available than chauffeurs or locomotive and train crews. Sixth, the source of power supply can be power houses located in nearly any city with a population over 15,000, and such cities are located within reasonable transmission distances of each other.

"I think that it would be fitting at this time to consider the organization of our members into a transportation unit to be available in time of war, to cooperate with the government along the lines indicated."

Wheel and Tire Specifications Revised

American Society for Testing Materials Recommends Changes in Connection with Tolerances

AT THE nineteenth annual meeting of the American Society for Testing Materials, held in Atlantic City on June 27-30, 1916, the committee on steel recommended a number of revisions of existing standards. Among these is a suggested change in the standard specifications for solid wrought-carbon steel wheels for electric railway service. By these changes the wheels are classified so that rolled wheels would become class A, and machined wheels class B. The requirement as to rotundity for class B wheels is to be changed so that the opening between the tread and the ring gage shall not exceed 1-64 in. instead of 1-32 in. The present requirement as to permissible variation in the tape sizes (six tapes over, or four tapes under the size specified) are made to apply only to wheels with treads less than 3 in. in width. For wheels with treads of 3 in. or over, the permissible variations are nine tapes over, or five tapes under the size specified. The requirement as to thickness of plate is to be changed to agree with those of the specification for wheels for steam railway service. Also, the permissible variation of the diameter of hub over that specified is to be changed from $\frac{5}{8}$ in. to $\frac{3}{4}$ in., and the requirement as to projection of front plate of hub has been omitted. The requirement that the projection of the back plate of hub from the gage line shall not vary more than 1-32 in. over nor more than 1-16 in. under that specified, is to be changed to read that the projection of the hub beyond the back plate of the rim shall not vary more than 1-16 in. from that specified. Changes in marking are also included in the recommended revisions.

Revisions of the standard specification for steel tires are recommended in connection with the chemical properties and tests. The drop test is to be omitted, and the tension test is required only if specified by the purchaser. The requirement as to the permissible variation in inside diameter is to be modified so as always to permit a variation of $\frac{1}{4}$ in. less than the diameter specified. The present specifications base a variation on the finished diameter, allowing $\frac{3}{8}$ in. less than this diameter, and as a consequence, when tires are ordered rough bored $\frac{1}{4}$ in. less than the finished inside diameter, the available variation is only $\frac{1}{8}$ in. below the variation specified. Permissible variations are also specified in the outside diameter amounting to $\frac{1}{2}$ in. over for tires less than 54 in. in diameter.

The committee announced that it would take up, next year, in addition to other matters, the subject of specifications for steel ties.

Boat Trip of C. E. R. A.

Four Days' Cruise Was Successfully Begun—Impromptu Talks Were Given Wednesday Morning—Special Cars Were Run to Place of Embarkation

(By Telegram from Mackinac Island)

THREE hundred members, their families and guests of the Central Electric Railway Association sailed from Toledo on Tuesday morning, June 27, on the steamer South American for the four days' cruise on the Upper Great Lakes. The weather has been fair and warm up to the time of filing this telegram at Mackinac Island, Michigan, and already plans are well under way for another boat trip next year. On Tuesday afternoon a stop of one hour was made at Detroit, where other members joined the boat party. The evening was spent in viewing the scenery along the shores of Lake St. Clair, the St. Clair River and Lake Huron, in dancing and in a musical program.

The only association meeting was held on Wednesday morning, with President A. Benham in the chair. After the usual preliminaries E. B. Peck, vice-president Terre Haute, Indianapolis & Eastern Traction Company, chairman of the joint folder committee, reported the progress it had made in obtaining subscriptions from member companies. He said that the work of this committee had started about three years ago, but the committee had not received full authority to act until November, 1915. The details of the folder have been worked out, and bids have been received from publishers for the printing. He said forms of contracts for the member companies had also been prepared and mailed, but the response had not been very encouraging. Only fourteen contracts out of fifty-eight sent out had been returned signed.

Mr. Peck then said that the cost of the interline folders was \$21.30 per thousand, and that no railway's timetable would appear in the folder unless it subscribed and was a member of the association. The benefits to be derived from such a folder were apparent, and it was of just as much value to the smaller companies as to the large ones. He said that there was no question but that the public's lack of information concerning interline schedules and connections lost the member companies a large amount of passenger traffic annually. If all companies would subscribe, the folder could be made to cover 8000 miles of electric railways. It would be placed in 668 folder racks, and it was intended to issue 10,000 folders monthly under the contract to be made with the printers. The cost will vary with the market price of paper, and with the quantity of folders printed. The number of member companies which had subscribed up to the time of the meeting was just sufficient to make the first issue of the folder possible.

Mr. Peck then urged other member companies to subscribe. He said that the Traffic Association had issued an interline passenger traffic tariff which had been distributed to all member companies. With this the cost of a trip could be determined, but the time and connections could not. The committee also decided that the folders should not contain any outside advertisements to detract from its value. If any railway, however, cared to advertise its service, that would be permitted. In conclusion, he said that the association map had been one of the most creditable things the association had done in a traffic way, but that the interline folder was needed to give the map value as a traffic stimulator.

Charles L. Henry then moved that the association approve the acts of the committee and recommended that it diligently push the work of obtaining signatures to contracts. This motion was adopted.

President Benham then read a telegram he had re-

ceived from J. J. Dempsey, president of the New York Electric Railway Association, which was also holding a meeting at Niagara Falls, extending its best wishes for a successful meeting. Upon motion, the president was authorized to respond with greetings and best wishes by wireless telegraph.

President Benham then introduced F. D. Carpenter, president Western Ohio Railway, who spoke of the difficulties encountered in the early days of the association and told of its growth and work. He believed that the Central Electric Railway Association was of more value to the members than the American Electric Railway Association, because the latter devoted its work to a larger sphere and not to local problems. He then announced that the executive committee, which had held a meeting on the boat Tuesday afternoon, had decided to hold the next meeting of the association in Toledo on Nov. 23 and 24. At this point, Secretary Neereamer read the names of five applicants for membership, and announced that this brought the total supply men membership up to 151, or the largest number in the history of the association.

The remainder of the session was given over to extemporaneous speeches, which were opened by J. H. Drew, president Drew Electric & Manufacturing Company. Hugh M. Wilson, vice-president McGraw Publishing Company, followed with a few complimentary remarks about the work of the Central Electric Railway Association. He said he was particularly impressed by its endeavor to humanize the business. This policy helped to solve many business problems and was a step toward improving relations with the public. S. D. Hutchins, Westinghouse Traction Brake Company, emphasized Mr. Wilson's thought, and as chairman of the Supply Men's committee which arranged the trip, he called attention to its work, and thanked the members, the press, and particularly John Benham, who had done most of the work. John Benham responded fittingly, and then urged the members to support the interline folder committee in its program.

J. A. McGowan, secretary and treasurer Terre Haute, Indianapolis & Eastern Traction Company, then reminded the members of the great strides made in modes of transportation, and predicted a bright future for the association and electric railways. Frank Garland, director of the welfare department, Dayton, Ohio, outlined the Dayton plan of government and the work of his department in particular. He urged the humanizing of business and government as a means of increasing efficiency and to meet the crisis which he predicted would follow the ending of the European war. A. Swartz, Cities Service Company, Toledo, closed the addresses with a few well-chosen remarks. Mr. Henry then read a telegram of greeting from L. S. Storrs, vice-president of the American Electric Railway Association, and E. B. Burritt, its secretary. President Benham then read a letter from J. F. Collins, vice-president and general manager Michigan Railway, inviting all those who intended to return to Toledo to accept the use of his private car from Holland, Mich., to Grand Rapids, Jackson, Detroit, and Toledo. C. K. Minary, president Benton Harbor-St. Joe Railway, also invited the association to take lunch with him at the "House of David," a religious colony at St. Joseph, Mich.

Prior to the trip special cars to Toledo were run from Indianapolis by way of Fort Wayne and by way of Dayton. S. W. Greenland, general manager Fort Wayne & Northern Indiana Traction Company, served a tent lunch at Fort Wayne for one party, and R. A. Crume, general manager Dayton & Troy Electric Railway, served a box lunch at Dayton for the other party. There were forty-seven passengers on the car that ran by way of Fort Wayne, and the 263-mile run was made in nine

hours and thirty-seven minutes. The trip by way of Dayton was made in the same time, although the total run was 11 miles further.

Third Avenue Railway Coasting Contest

Recently an argument arose between Inspector McElroy and Chief Inspector Broderick of the Third Avenue Railway System, New York, as to relative coasting ability of the day and relief men on the 145th Street Broadway line. The men made a wager for new hats, Mr. Broderick backing the relief crews and Mr. McElroy the day crews. The contest resulted as follows:

DAY MEN, MOTORMEN

Cunniff, No. 668.....	47.0 per cent
O'Brein, No. 785.....	41.4 per cent
Gillespie, No. 504.....	41.0 per cent
McBride, No. 865.....	38.4 per cent
Newman, No. 859.....	36.4 per cent
Westhausen, No. 878.....	36.0 per cent

Average for week ending June 7..... 40.0 per cent

RELIEF MEN, MOTORMEN

Heaney, No. 896.....	56.5 per cent
Foley, No. 799.....	54.0 per cent
Sheehan, No. 802.....	44.0 per cent
Henry, No. 781.....	43.3 per cent
McConnell, No. 845.....	42.0 per cent
McDonough, No. 543.....	36.6 per cent

Average for week ending June 7..... 43.3 per cent

Average number of passengers carried daily.....	7,705
Average daily mileage.....	988
Average speed, miles per hour.....	8.52
Average mileage per crew per day.....	82
Total hours for week.....	799
Total number of hours in which motormen operated their cars with the controller on off position.....	333 out of 799

It may be added that the relief men work from 11 a. m. to 1 p. m. and then from 5 p. m. onward. In both classes the evening rush is included. Therefore the running conditions were fairly comparable.

New Haven's Efforts for Automatic Train Control

The New Haven Railroad, the better to handle its investigation of automatic train control, has appointed F. H. Nicholson assistant engineer. Mr. Nicholson will devote his whole time to this important subject. The appointment is to come under the jurisdiction of Signal Engineer Morrison's office. It is the intention of the New Haven management to conduct further experiments and tests on its own lines; to make thorough investigation of trial installations on other roads, and to continue the examination of train control devices brought to its attention by inventors and others. The investigation will be directed in an effort to determine the degree of practicability of each scheme measured by conditions on the New Haven Railroad. During the past four years the New Haven has examined a large number of plans of automatic stops, and has conducted tests of two trial installations on its own lines. The examination of these plans, more than 4000 in number, has convinced its engineering and operating officials that automatic train control has not reached the degree of development that would eliminate introduction of other and greater hazards, and warrant either universal or limited adoption by the New Haven. It is recognized, however, that a great deal of persistent and intelligent effort is being directed to the solution of the problem involved in the automatic control of trains, and the appointment of Mr. Nicholson to follow this work is in line with the purpose of the management to keep itself thoroughly and promptly informed of progress in the development of automatic train control.

AMERICAN ASSOCIATION NEWS

Committee Meetings of the Week

Meetings of two association committees were held during the current week. The sub-committee on property ledger of the joint engineering-accounting committee met in New York, June 28, to complete its report. Those present were: F. H. Sillick, New York; J. C. Collins, Rochester, N. Y., and Harold Bates, New Haven, Conn. There was also a meeting of the joint committee on claims-transportation at Buffalo on June 26.

Hearing on Clearance and Hours of Service Bill

At the request of the committee on federal relations of the American Electric Railway Association, a sub-committee of the United States House Committee on Interstate and Foreign Commerce held a hearing on the morning of June 21 to hear any objections which electric railway companies might wish to make to the "clearance" bill and the "hours of service" bill now before Congress. These were the bills to which the committee on federal relations recently called the attention of the member companies of the association, as mentioned on page 1044 of the issue of this paper for June 3. The clearance bill (H. R. 9047) specifies that car clearances should not be less than 3 ft., except at stations or freight house platforms, and that the overhead clearance should be not less than 6 ft. The hours of service bill (H. R. 9216) amends the hours of service act by reducing from nine to eight the hours of service of signal and switch operators, but the bill is so worded as to include motormen and conductors of interurban roads engaged in interstate commerce by classifying them with dispatchers in case they receive or report orders by telephone.

Those electric railway managers present at the hearing were: Arthur W. Brady, Anderson, Ind.; W. P. Megaree, Philadelphia; A. V. Brown, Sandusky, Ohio; M. S. Morgan, Springfield, Ohio; John L. O'Toole, Newark, N. J.; H. S. Lyons, Boston; B. F. Weadock, Detroit; E. C. Foster, Manchester, N. H., and R. I. Todd, Indianapolis. Others in attendance at the meeting included the national officers from four of the steam railroad employees' associations, representing the conductors, engineers, firemen and trainmen. The principal argument in behalf of the electric railway interests was made by Arthur W. Brady, chairman committee on federal relations. The members of the sub-committee manifested a close interest in the points brought out by Mr. Brady, and asked a number of questions of him and of some of the other electric railway representatives in attendance. After some discussion, in which the labor representatives in attendance participated, the latter withdrew any objections they might have had to an amendment to the bill to exempt from its provisions all interurban and city railways that were operated entirely by electricity. As that was the object for which the hearing was held, the chairman requested that the official stenographer make a note of the fact that the proponents of the bill had agreed to exempt from its provisions electric street railway companies. The hearing was declared closed without any further discussion on that subject.

On the following day a hearing was held by the full committee on commerce on the hours of service bill. Practically every member was present, and the hearing was continued for about two hours, Mr. Brady giving the principal testimony and presenting a proposed

amendment exempting electric railways from the provisions of the act. The committee took the stand that the proposed amendment was so broad that it repealed the present hours of labor law, and requested the electric railway representatives to draw up another amendment which would meet the ideas of the committee, indicating that such an amendment would be acceptable. Mr. Brady agreed to do this, and the meeting then closed.

Rowdiness on Interurban Cars

Placards Calling Attention to Various Sections of Ohio Laws Have Desired Effect in Reducing This Evil

THE Northwestern Ohio Railway & Power Company, Toledo, Ohio, which connects Toledo, Genoa, Port Clinton and Oak Harbor, has for some time had considerable difficulty with rowdiness on its cars. This arose from the fact that a very large part of the riding public consists of foreign passengers from the limestone quarries and gypsum mines in the company's territory. Recently, however, the company had printed a placard (7 in. x 11 in.), as shown in the accompanying illustration, calling attention to various sections of the Ohio laws concerning the police rights and duties of the conductors on interurban cars. Two of these cards were framed and placed in each car, one in the smoking compartment and one in the other part of the car, and some were also placed in stations and at other points within easy view of the public. Since these cards

The Northwestern Ohio Railway & Power Co

Attention of Passengers is called to the following Sections of the Ohio Laws concerning Police Rights and Duties of Conductors on Interurban Cars

Sec. 3433. [When a passenger conductor is a policeman.] The conductor of every train carrying passengers within this state and the conductor of the car or cars of every interurban railroad carrying passengers within this state, is hereby invested with all of the powers, duties and responsibilities of police officers, while on duty on his train or on said car or cars, and said conductor may wear the badge of a special policeman [73 v. 166, § 1; 97 v. 84.]

Sec. 3434. [When conductor may eject a passenger.] When a passenger is guilty of disorderly conduct, or uses any obscene language, or plays any game of cards or chance for money or any other thing of value, upon any passenger train or upon the car or cars of any interurban railroad carrying passengers within this state, the conductor of such train or car or cars of such interurban railroad shall stop his train or said car or cars at the place where such offense is committed, or at the next stopping place of such train or of such car or cars, and eject such passenger from the train or from said car or cars, using only such force as may be necessary to accomplish such removal; and the conductor may command the assistance of the employees of the company, person, firm or corporation owning or operating such road or roads and of the passengers on such train or on such car or cars to assist in such removal; but before doing so he shall tender to such passenger such proportion of the fare he paid as the distance he then is from the place to which he has paid fare bears to the whole distance for which his fare is paid. [73 v. 166, §2; 97 v. 84.]

Sec. 3435. [When a conductor may arrest a passenger.] When a passenger is guilty of any offense upon a passenger train or upon the car or cars of any interurban railroad carrying passengers within this state, the conductor of such train or of such cars may arrest him and take him before any magistrate having cognizance of such offense, in any county in this state in which such train or car or cars of any interurban railroad runs, and file an affidavit before such magistrate, charging him with such offense; but in no case shall the liability of a railroad company for damages caused by the conduct of its conductor be affected by the provisions of this and the next preceding section. [73 v. 166, § 3; 97 v. 84.]

Sec. 3436. [Penalties against conductors for violations of two preceding sections.] A conductor having charge of a passenger train or of the car or cars of any interurban railroad carrying passengers within this state, who wilfully neglects his duty as required by the two preceding sections, or fails to use all the means in his power to carry out the requirements of such sections, shall be deemed guilty of negligence of official duty, and on conviction thereof, before any court having competent jurisdiction, shall be fined not less than five nor more than twenty-five dollars. [73 v. 166, § 4; 97 v. 85.]

THE NORTHWESTERN OHIO RAILWAY & POWER CO.
E. A. BURRILL, Gen. Mgr.

were posted there has been a perceptible decrease in rowdyism, until now it is the exception rather than the rule.

COMMUNICATION

B. & O. Belt Line Electrification Reminiscences

NEW YORK, June 26, 1916.

To the Editors:

I wish to add a few comments to the article on "Operation on the Baltimore & Ohio Electrification," appearing at page 1074 in the issue of the *ELECTRIC RAILWAY JOURNAL* for June 10. Considerable of my early experience in electric traction work was obtained during the several years I was connected with this company, and, because of holding a leading position in connection with the changing from overhead conductor system to third-rail, I have an intimate knowledge of the difficulties experienced and the methods of solution adopted. It would be possible to make several articles of the interesting experiences had in this early work; however, for obvious reasons I don't expect to make them. Erroneous ideas could very readily become current regarding the history of this matter, and it is well to take the opportune time to place on record some of the leading facts.

I will first refer to an article in the *STREET RAILWAY JOURNAL*, of March 14, 1903, pages 398 to 405, under the name of W. D. Young, which makes a plain statement of the conditions encountered at that time, although the caption of the cut at top of page 401 should read "Crossing at North Avenue" and not "Huntingdon Avenue." The following facts are worthy of note:

In the Belt Line tunnel, live steam locomotives were frequently passing. Those going up-hill gave out a certain amount of gases even though not working under steam. Those going down-hill gave out still more gas when accelerating trains at the entrance of the tunnel, after a passenger or block signal stop. For some time previous to the receipt of the 1903 type of electric locomotive, the conditions in the tunnel were pretty bad because the steam locomotives going up-hill with the throttles open, due to the inability of the 1894 type of locomotives to handle the heavier freight trains without working steam. The chief difficulty with the overhead structure, therefore, was one of the worst cases of corrosion I have ever seen, due to the gases and dampness. The tunnel was later grouted with cement to make it drier, there being springs in the surrounding ground in places.

I will not here go over again the difficulties of constructing a third-rail in a long tunnel with trains in constant operation, neither the tunnel nor the right-of-way generally, nor the locomotives themselves, having been designed for third-rail operation. The results of our work were quite satisfactory; although doubtless capable of some further improvement, as many years of experience have demonstrated. In comparing this installation with the third-rail systems installed by the New York Central & Hudson River Railroad, and by the Pennsylvania Railroad, it is to be remembered that the New York Central tunnel was entirely reconstructed, and the Pennsylvania tunnels were entirely new, both being built with a view to third-rail operation, and both installations were subsequent to ours and the designers had the benefit of our experience.

The third-rail shoe rigging designed for the 1894-

type locomotive and illustrated at page 403, *STREET RAILWAY JOURNAL*, March 14, 1903, operated quite satisfactorily, and was retained in use until these locomotives were retired from service. The 1903-type locomotive illustrated on page 1077 of the issue for June 10 was designed for third-rail operation, and a different type of shoe rigging was furnished with it. The same is true of the so-called "1910 type." The point I make is: The equipment designed by us in 1902 perfectly met the conditions of overhang, clearance, good contact, etc., and was retained on the locomotives until they were retired. The movable third-rail equipment designed by us is still in operation. The changes in third-rail support and protection are not great. The type illustrated on page 1078 does not differ greatly from the type illustrated on page 400, March 14, 1903. W. D. Young, electrical engineer, and the writer as assistant electrical engineer, were both with the company for some years after the completion of this third-rail work, since our territory covered the whole system from the Atlantic Coast to Chicago.

I am pleased to see the Baltimore Belt Line given the attention its importance merits. To illustrate how readily erroneous impressions are obtained, I will add an anecdote. During the work of third-rail installation, I found myself one day in the cab at the head of a freight train, awaiting the Royal Limited to clear the track ahead. The observation car of the latter had stopped alongside the locomotive out of the window of which I was looking. A gentleman with the appearance of a prosperous traveling salesman, seated on the observation platform, asked a few questions about the electrical equipment and incidentally brought out the fact that he thought the Belt Line tunnel went under the Chesapeake Bay. I explained to him that before its construction, trains to Philadelphia had been ferried across Baltimore harbor by a car ferry, but this harbor was some miles from the Bay although the Patapsco River is very wide between the city and the bay, and only an expert can tell where river ends and bay begins. Probably many persons have traveled between New York and Washington with the idea that they passed through a tunnel under the Chesapeake Bay. It is in the hope of correcting other possible errors in engineering circles just as far from the truth as that of the traveler mentioned, that I have added the foregoing notes to the article in the issue of June 10, 1916.

H. J. KENNEDY, M. E.,

Electric Railway and Industrial Plant Engineer.

Electrical Week Local Committeemen Appointed

Every city with a population of 20,000 or more will have a committee in charge of local arrangements for the America's Electrical Week campaign this fall. The national executive committee in charge of the movement, of which Gerard Swope, vice-president of the Western Electric Company, is chairman, recently announced its appointments of chairmen and local committeemen. More than 1200 representative electrical men have been appointed. The executive committee, through the Society for Electrical Development, Inc., made every effort to have the list representative of the different electrical interests, the Jovian Order, the Rotary Clubs and civic associations where they rendered co-operation during the electrical prosperity week campaign. The committee list is most imposing. It contains the names of many nationally prominent men who have accepted the chairmanship of local committees, and who have pledged their support.

ing is subjected to heavy impacts, the manganese steel surrounding the weld chatters.

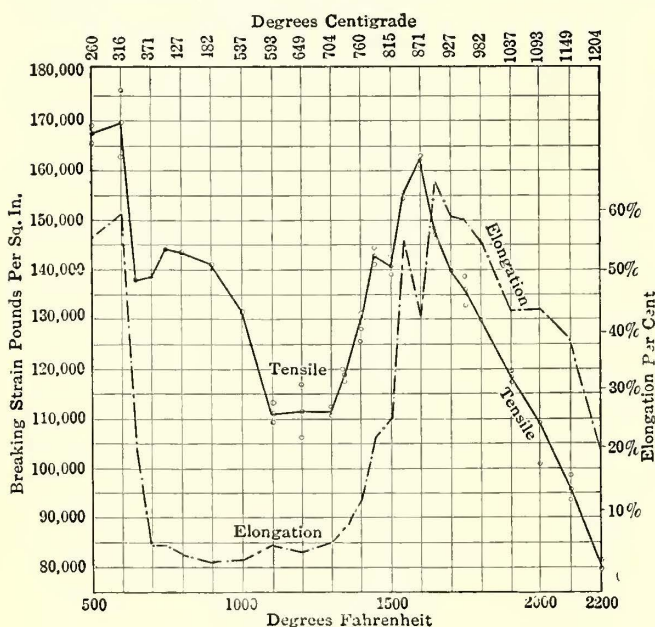
Since welds to heat-treated steel are regarded with disfavor by metallurgists, particularly when the work is done in the field, little or no scientific information has been available, which will account for the large percentage of successes. In order to obtain the best information available on this subject a number of authorities were consulted and their suggestions are incorporated in this article. Perhaps the paper by W. S. Potter, president of the Alloy Steel Forging Company, Pittsburgh, Pa., in the April, 1915, *Bulletin* of the American Institute of Mining Engineers, is as authoritative as any available at this time. In this article Mr. Potter presents data showing the relation of heat treatment to the tensile properties of rolled manganese steel. The result of the author's experiments is quite clearly shown in the diagram accompanying this article. Although the method of manufacture of rolled manganese steel differs from cast manganese steel, the chemical analysis is practically the same for both, and the effect

tion rise rapidly until a temperature of 1600 deg. Fahr. is reached. As the rods were reheated and quenched at temperatures above this point, both the breaking strain and the elongation per cent dropped off, but not as rapidly as they did at 600 deg. Fahr.

As a result of these tests the author found that there were two temperature regions where the effect of reheating the metal was about uniform. The first region was after water-quenching the rods from the heat of rolling to a point where they were reheated to a temperature exceeding 600 deg. Fahr. and quenched. In other words, if the temperature was maintained below this maximum, the characteristics of the reheated and quenched metal were not changed appreciably. The second region, giving approximately uniform properties, was between 1550 deg. Fahr. and 1750 deg. Fahr. Between these two regions the metal was found to be weak and brittle, and beyond the second region, namely, 1750 deg., the specimen when bent or stretched cracked generally between grains, showing a very low grain of adhesion.

The foregoing information, when applied to welds made on manganese steel special work in the field, largely explains the vagaries of the metal and the causes of the defective welds. If the temperature of the heat-treated manganese steel adjacent to the point of the weld could be maintained below 600 deg. Fahr. doubtless the welds would be successful. Welds in which the temperature of the surrounding heat-treated steel is raised to a point between 1550 and 1750 deg., after which the heated areas are promptly quenched, should also result in successful welds. However, it is impossible to weld at the lower temperature, and to control any temperature to such a nicety is a very delicate operation, because it is impossible to retard radiation from the welded zone. It is not so difficult to restrict the heated area and maintain low temperatures in them, hence it appears that this is about the only practical solution of the problem, and the one which welders should follow. Low temperatures in the body casting may be maintained by frequent quenching or by building on small portions of welded metal at one time. In other words, natural radiation keeps the temperature down within the welded region. This minimizes the damage to the casting, and no doubt accounts for the large per cent of successful welds obtained by those who build on slowly and quench frequently. Another method might be suggested, namely, that of fixing the relation between the size of the metal electrode and the radiation characteristics of manganese steel so that the rate of building on the new metal would be practically equal to the rate at which the heat is radiated or dissipated from the main casting. Experiments along this line might be productive of results very advantageous to operators in obtaining a larger number of successful welds.

Undoubtedly the variation in results obtained by different operators in making repairs by welding on manganese steel special work may be attributed as largely due either to inexperience or lack of authoritative information. The conclusion to be drawn from the results of Mr. Potter's tests as well as Mr. Armstrong's article is that a thorough knowledge of the subject accompanied by scientific methods should be attended by a larger number of successful welds. Lack of this information, however, has made cut and try methods necessary to obtain satisfactory results. Perhaps more extended tests along the lines suggested in these articles would also be very instructive, particularly if the relation of the welding temperature and rate of heat radiation of the manganese steel were known. With this information operators could control their work by timing it rather than by using a thermometer.



EFFECT OF HEAT ON BREAKING STRAIN OF MANGANESE

of heat treatment is very similar. Since the publication of this article Mr. Potter has been consulted, and he bears out the foregoing statement.

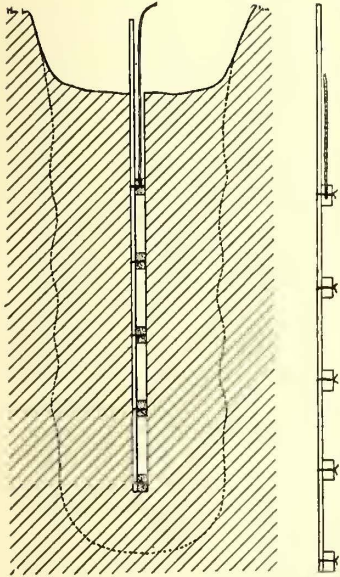
To obtain the points on the two curves shown in the accompanying diagram, Mr. Potter had tested a large number of $\frac{3}{8}$ -in. round rods, the chemical analysis being as follows: Manganese, 13 per cent, and carbon, 1.02 per cent. These rods were of rolled manganese steel, quenched as it came from the heat of rolling. The relation of heat treatment to the tensile property was obtained from twenty-five lots of test rods containing ten each. Each lot of rods was reheated for one hour at the various temperatures shown, and then water-quenched. In other words, the various tests produced a cycle of changes in the physical properties somewhat similar to those through which the manganese steel surrounding the weld passes when water-quenched following the welding operation.

Reference to Mr. Potter's diagram shows that a marked drop in the breaking strain or per cent of elongation occurs between 600 deg. and 700 deg. Fahr., and, after reaching the low point, this condition obtains until the rods are reheated above 1300 deg. Fahr. At this point the breaking strain and per cent of elonga-

Blasting Pole Holes in Clay

BY J. H. SQUIRES, M.S., PH.D.

The use of dynamite for digging deep pole holes in hard clay is a new development that is proving effective in saving time and expense. It is also reducing the number of laborers required for hole digging. The old method of using small charges of dynamite to loosen the ground to make digging easier is well known and has been in use for a long time. After an extended series of tests, a method has been perfected for blasting deep holes. In brief, this method is as follows:



METHOD OF LOADING TO BLAST DEEP POLE HOLE—LATH WITH DYNAMITE CHARGES

A hole from 6 in. to 10 in. deep to the full diameter of the desired hole is dug. This shallow hole has the effect of relieving the pressure on the soil that is to be excavated and assists in preventing excessive shattering of the sides.

A small bore or loading hole is put down in the middle of this shallow hole to the desired depth. This is done by means of augers, bars, drills or churn drill, depending on the nature of the ground and personal preference of the worker.

The charge is made up by tying small pieces of dynamite to a light lath. The charge intended for the bottom of the hole is placed at the end of the lath. The other charges, which may be from one-fourth to a full cartridge of dynamite, are spaced along the lath at intervals of from 6 in. to 24 in., depending on the hardness of the ground and the size of the hole desired. The top piece of dynamite is primed with a blasting cap and fuse or with an electric blasting cap. This primer charge is so placed on the lath as to be from 20 in. to 25 in. below the surface when the charge is loaded into the bore hole. The two accompanying sketches show the general method. In the larger drawing the dotted line shows the size and shape of the blasted hole.

The long charge is loaded into the bore hole, cap end up. The explosion of the top charge will fire the others. Care must be taken to keep clods of earth and stones from falling in the hole, as these may interfere with the loading or firing. Frequently no tamping is used in the top of the hole. In some soils a few inches of tamping will materially help the blast. Tamping should never be permitted to go below the top charge, as it will interfere with the explosion of the bottom charges. From this method of loading the following results were obtained.

All holes mentioned below were 4½ ft. deep. The soils varied from hard, dry clays to wet, compacted clays with some shale. In all cases the ground was of such a nature that the use of digging bar or chisel was necessary when hand labor was employed.

1. One-half cartridge low freezing extra 40 per cent dynamite in bottom of hole, untamped, results poor; large cavity blown in bottom of hole about 30 in. in diameter; earth for 2½ ft. below the surface thoroughly disturbed.

2. One-third cartridge straight 60 per cent dynamite

in the bottom of the hole; one-third cartridge of same 8 in. from bottom; half cartridge 40 per cent low freezing extra 20 in. below surface; cap in the top, untamped, results good. Hole clean and open.

3. One cartridge straight 60 per cent dynamite at bottom; same 12 in. up; same 12 in. up; cap in top, untamped; results same as 2, except more earth was thrown out of the hole.

4. Five quarter cartridges straight 60 per cent dynamite, evenly distributed about 6 in. apart, beginning at bottom of hole, untamped, cap at top. Results good, hole uniform in size, top and bottom, dirt blown out.

5. Four quarter cartridges low freezing extra 40 per cent dynamite, distributed same as 4. Results good, same as 4 with not so much dirt blown out of hole.

Additional tests over a variety of soil conditions gave the same results.

From the above it will be learned that a few trial shots may be needed to determine the exact loading required. Better holes can be blasted in moist than in dry clay. All of the dirt is not blasted out of the hole, as much of it is packed tightly into the sides of the holes. Sometimes a plug or bridge of earth is left in the top of well-blasted holes after the blast. This is not objectionable, as it can be easily shoveled out. This leaving of the plug in the top frequently is a necessary safeguard to prevent excessive shattering or loosening at the top of the hole. A little hand finish is always required for blasted holes. This usually requires from two to six minutes of work. Good blasting does not injure the sides of the holes to such an extent as to interfere with good tamping.

The explosives used in the work as cited above are low freezing extra, 40 per cent or stronger, dynamite for cold weather. This can also be used in warm weather, but as the straight dynamites are more sensitive and quicker in their action they are frequently found more satisfactory in warm weather.

Sealed Fuse Cabinet Guarantees Supply

BY H. A. MULLETT

Superintendent of Rolling Stock Milwaukee Electric Railway & Light Company, Milwaukee, Wis.

Occasionally delays in service may be attributed to the fact that an insufficient quantity of fuses for replacements have not been made a part of a car's equipment. In order to obviate any possibility of delays being charged to this account, the mechanical department of the Milwaukee Electric Railway & Light Company,



SEALED FUSE CABINET ON MILWAUKEE ELECTRIC RAILWAY CARS

Milwaukee, Wis., has installed suitable sealed fuse cabinets in all of its cars. Experience has demonstrated that this method of carrying the fuses guarantees that the standard quantity will be carried on all cars.

Each car is provided with a small compartment over the center sash of the vestibule, which is locked with a meter seal. In case a fuse blows in service, the motor-man breaks the seal and uses the fuse required. As he is not able to reseat the box the fact that the seal is broken is a notification to the repair force that the full quota of fuses is probably not in the cabinet. In that case it is the inspector's duty to check all the fuses and supply the proper number, after which the cabinet is again sealed. This method of handling fuses not only insures the presence of the proper quantity, but eliminates all delays to service which might be attributed to the fact that the car did not have extra fuses in good condition.

Renewal of Collector Rings on 400-Kw. Rotary Converters

BY JAMES W. BROWN

Superintendent of Shops Wilkes-Barre & Hazleton Railway and Lehigh Traction Company.

It is seldom necessary to renew collector rings on rotary converters, but occasionally one or more of the rings will wear down until the available thickness is such that a new ring will be required, or if one ring has worn thin and is perhaps $\frac{1}{8}$ in. to $\frac{3}{16}$ in. smaller than the other rings it must either be renewed or built up. As renewals are expensive, the following plans for rebuilding these rings to their original diameter have been used. The first instance is a converter which had been in service for about ten years and necessitated a renewal or rebuilding of all three rings.

The armature of this rotary, a 400-kw one, was taken out and placed in an engine lathe and a cut was taken on the ring of smallest diameter to true it up. In this case the ring was next to the d.c. winding. The next ring was similarly trued up except that it was made $\frac{1}{64}$ in. smaller in diameter. The next or outside ring was trued up $\frac{1}{64}$ in. smaller than the second ring. A bronze ring-band was then shrunk onto the ring next to the winding, it being $\frac{1}{64}$ in. larger than the second ring and $\frac{1}{32}$ in. larger than the outside ring.

The ring-bands were made of a bronze shell casting and were easily trued up to the proper inside and outside dimensions. The casting from which all three ring-bands were made was placed in a lathe and a cut taken on the outside, which left about $\frac{1}{32}$ in. of metal to true up the rings after they had been shrunk on. It was then bored to the proper inside dimensions to fit the three rings respectively, and the ring-bands were cut off to the proper width. The inside ring-band, being of the largest inside diameter, was slipped over the two outside rings and shrunk on, in the same manner the middle ring-band was slipped over the outside ring and shrunk onto the middle ring. The outside ring-band was then shrunk onto the outside ring. Four $\frac{1}{4}$ -in. holes were drilled through the ring into the spider arm. These were tapped and $\frac{1}{4}$ -in. brass screws with twenty-four threads to the inch were put in. A single finishing cut was then taken on all these rings, after which they were sanded and polished. The armature was then replaced, and the rings were in such shape that they will probably outlast the usefulness of the machine.

In another instance, on one of our 400-kw. rotary converters the inside ring was worn down until it was $\frac{5}{16}$ in. smaller in diameter than the other two rings. The problem was, therefore, to add a bronze ring about $\frac{3}{8}$ in. thick to the inside ring so it would true up $\frac{1}{64}$

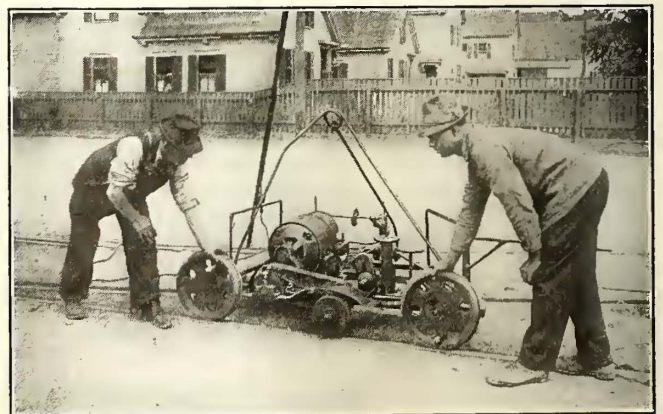
in. larger than the middle ring and $\frac{1}{32}$ in. larger than the outside ring. This was accomplished in the following manner: A cut was taken off the inside ring, then a ring-band was made so that the outside diameter would true up $\frac{1}{64}$ in. and $\frac{1}{32}$ in. larger than that of two other rings respectively. The inside diameter of the ring-band was bored to the same diameter that the inside ring had been previously trued up to. This ring-band was then cut off the proper width and a cut was taken through it on a 45 deg. angle with a hack saw. This ring-band was spread and slipped over the two larger rings. An iron band $\frac{3}{16}$ in. thick by 2 in. wide with flanges turned back to take a $\frac{3}{8}$ -in. bolt was then slipped over the ring-band, which was in position on the inside ring. Four $\frac{1}{4}$ -in. holes were drilled in this iron band opposite the spider arms. The $\frac{3}{8}$ -in. bolt was tightened up, which caused the ring-band to be drawn tight to the ring and thus made a perfect fit. Holes were drilled in the ring and spider arms and tapped to take $\frac{1}{4}$ -in. brass screws with twenty-four threads to the inch. The screws were then put in, the iron band removed, and the joint made by the hack saw was soldered and filed. A finishing cut was taken to bring the ring to the proper diameter, so that bands could be shrunk on, as previously described in this article.

These machines have been running for several years since the bands were shrunk on and have given excellent results. The cost of doing this work was very small, as the scrap turnings and borings were sold for a price that went a great way toward reducing the cost of renewing the collector rings.

Rail-Grinding Practice of the Bay State Street Railway

The practice of the Bay State Street Railway in building up rail joints for the last two years has been greatly improved by the use of Seymour portable electric rail grinders and Indianapolis portable electric welders. One of the grinders is shown in an accompanying illustration. By this means track which would otherwise have required costly repairs has been put in good condition at a small cost.

A hard-center frog, built up with the welder, has been ground $\frac{3}{16}$ in. to the true surface of the rail



TYPE OF PORTABLE RAIL GRINDER USED BY BAY STATE STREET RAILWAY

over a length of 12 in. in about fifteen minutes. An average depression of $\frac{3}{16}$ in. caused by battered and pounded joints has been removed in about the same length of time by grinding 24 in. on either side of the joint.

The average cost of grinding a repaired joint which is 12 in. long and $\frac{1}{8}$ in. above the surface of the rail has

been 25 cents. As many as twenty-eight rail joints, 8 to 20 in. long, built up with manganese steel, have been ground to the required level in a single working day.

These Seymour grinders are now used on the following divisions of this road: Lowell, Lawrence, Lynn, Salem, Chelsea, Fall River and Brockton. This grinder was perfected and patented by E. P. Seymour, road-master of the Lowell division of the Bay State Street Railway system.

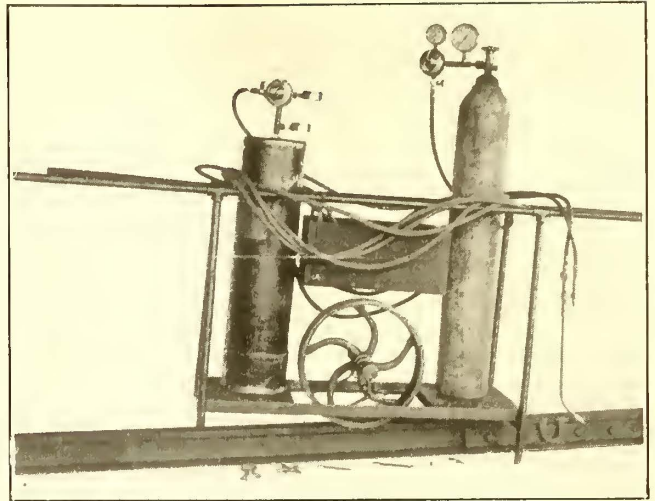
Steel Terminal Casing Increases Strength of Rail Bond

Increased mechanical strength in conjunction with a reduction in weight without a proportionate decrease in electrical conductivity, has been obtained in a rail bond by the substitution of a copper terminal incased in a steel sleeve for the usual all-copper terminal. The Simplex rail bond recently put on the market by the Hartman Electrical Mfg. Company, Mansfield, Ohio, conforms to these claims, and it is designed to be attached to the ball of the rail by the gas-weld or oxy-acetylene process.

The advantage of applying bonds by this process is the low initial cost of the equipment required and the ease with which it may be transported. To further increase portability this company has built a special carriage designed on the wheelbarrow principle, which reduces the weight to a minimum. The application of the steel sleeve as a substitute for the copper bar at the bond terminal reduces the weight of this No. 0000 bond to approximately 1/2 lb. The average welder, after some experience, is able to install these bonds at an approximate price of 25 cents each, or at a total cost of 59 cents per bond for all material and labor. The labor cost in this instance was figured on a basis of two men receiving \$2.50 per day each.

Increased mechanical strength in this bond is obtained through the split-steel sleeve which incases the compressed ends of the bond cable. This casing is provided with a ledge or table at a point about 1/4 in. from the end of the bond, and immediately above and below this ledge the steel casing tightly grips the compressed copper cable. The casing is flared where the bond cable emerges in order to absorb service vibrations without injuring the cable. In case of an attempt at theft the split sleeve tends to open when the cable is raised toward a horizontal position, thus reducing the leverage and making the bond more difficult to remove. The features of this bond are shown in the accompanying illustrations.

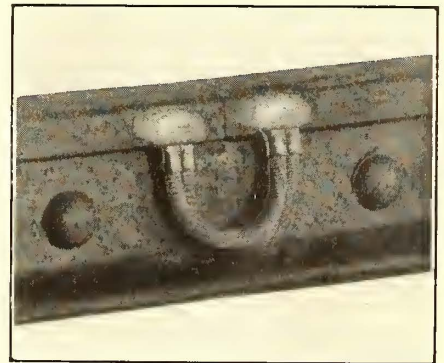
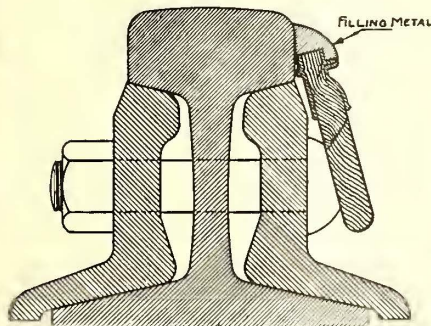
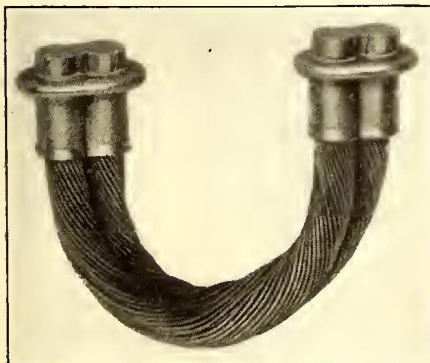
In applying the bond to the rail it is held in position by a spring clamp fastened to one bond terminal while the other is being welded. The oxy-acetylene flame is directed against the rail and the terminal until



TRUCK WITH COMPLETE WELDING EQUIPMENT

both are heated to a welding temperature, at which time the filling metal, in rod form, is inserted in the flame and melted. The molten metal welds to the rail and to the steel casing of the bond, as well as to the exposed ends of the compressed copper strand. The welding operation is continued until the filling metal is built up from the ledge of casing over the bond terminal. The mechanical strength of this bond is thereby increased by the weld between the filling metal and the rail, and the filling metal and the steel sleeve. At the same time the bond conductivity is maintained by the weld between the filling metal and the rail and the filling metal and the exposed end of the copper cable in the steel casing. In connection with this bond, it is also of interest to call attention to the electrical advantages of the short bond over the long one. The conductivity of copper cable of No. 0000 capacity in a 7-in. bond is equivalent to 24 in. of 70-lb. rail, whereas a 10-in. No. 0000 bond is equivalent to 34 1/4 in. of 70-in. rail, and a 36-in. No. 0000 bond is equivalent to 123 1/4 in. of 70-lb. rail. In other words, the advantage in any type of bond is in favor of the short bond as opposed to the long one.

The Board of Public Utility Commissioners of New Jersey, Trenton, N. J., has issued Volumes II and III of its proceedings for the period from June 9, 1913, to May 12, 1914, and from May 12, 1914, to July 12, 1915. These volumes contain only the opinions and decisions of the board and are distinct from the annual reports made to the Governor. The board has also issued under date of 1916 an index to Volume I of its proceedings for the period from May 1, 1911, to June 1, 1913.



SIMPLEX RAIL BOND WITH STEEL CASING SHOWING SECTION THROUGH WELDED TERMINAL AND INSTALLED BOND

LONDON LETTER

Woman Conductor Acceptable—Increase in Glasgow Traffic
—Paper Shortage Becomes a Problem—Cars Used
in Barricade in Dublin Uprising

(From Our Regular Correspondent)

The woman conductor continues to arouse the admiration of all who come in contact with her, and officials of the big cities are unanimous in singing her praises. The woman conductor on the London omnibus has also proved a great success, even though her work is, to a certain extent, more arduous than that of her sister on the tramway, involving, as it does, climbing the stairs of a moving vehicle the top of which is open. The women conductors have to work practically the same hours as the men. They continue uniformly courteous, persevering and patient even in the face of annoyances. Many managers of tramways, indeed, go so far as to say that the women make fewer mistakes than the men, and collect more fares, and that there are fewer complaints against them. The woman conductor, therefore, has become popular not only with the traveling public, but also with her employers, both municipal and company. It might be interesting to state the number of women employed in a few of the largest cities. Glasgow, for instance, employs 1200; Birmingham, 700; Liverpool, 300; Sheffield, 600; Leeds, 400; while Salford, Aberdeen and Manchester each employs between 200 or 300. In Leeds there will soon be not more than fifty men conductors left, and as the average weekly wage earned by the women is now in the vicinity of 30s. there are still plenty of applicants for vacancies. While the women drivers in Glasgow continue to prove successful, it is not likely that women will be employed to run cars on the London tramways, as the chief commissioner of police has stated that he is not satisfied that women can safely be licensed to drive a tramcar or a motor bus in the metropolis. He previously refused to allow women conductors to be employed until pressure became too great for him.

The returns for the financial year of the Glasgow Corporation tramway department show an increase in the traffic receipts of £78,570, the total income from this source being £1,149,264. In the number of passengers there was an increase of 26,110,706, and the total carried is returned at 362,371,464. The car mileage run was 24,963,309, which was greater than that of the previous year by 748,849. The traffic receipts per car-mile work out at 11.049d., an advance of 0.437d. There is a decrease of 0.003d. in the receipts per passenger, which are given at 0.761d. There were 14.516 passengers carried per car-mile, representing an increase of 0.629. The average track mileage open during the year (single) was 196¼. There are eight different fares in operation on the system, and it is remarkable that last year there was a large increase in the number of passengers carried in each of the stages. The most striking was in the case of the long journeys, for which the fare is 4d. In this section the number of passengers rose to 192,956, compared with 153,270 in the previous year. At the other end of the scale the number carried at the ½d. fare was 232,871,360, almost 20,000,000 more than last year. The numbers of passengers dealt with at the other fares were as follows: 1d., 93,768,671, against 89,890,042 in the previous year; 1½d., 22,712,943, against 21,384,305; 2d., 6,913,560, against 6,410,027; 2½d., 3,075,567, against 2,834,795; 3d., 1,453,771, against 1,285,605; and 3½d., 1,382,636, against 1,136,895. Since the corporation took over the tramways on July 1, 1894, to May 31 last the number of passengers carried was 4,417,319,065, the mileage run was 361,006,250, and the car traffic revenue amounted to £16,060,483.

The rebellion of the Sinn Fein organization in Dublin resulted in the suspension of the service of the Dublin United Tramways from April 24 until May 4. While a few cars used by the rebels to entrench themselves were completely destroyed the damage done to the tramway system as a whole was not nearly so great as at first reported, and in a comparatively short time the power station and the distributing station were working normally.

The North-Eastern Railway, one of the pioneers in the electrification of passenger lines, has inaugurated the first electrically operated heavy goods railway in Great Britain. Electric locomotives, using current at 1500 volts, and each capable of hauling a 1400-ton train at a normal speed of

25 m.p.h. on the level, are now at work on the Shildon-Newport route, which is used to carry mineral between the coalfields of Southwest Durham and the blast-furnaces and iron works of the Middlesborough district. Particulars of the installation are published elsewhere in this issue.

The success which has attended the electrification of the North Manchester suburban line, has induced the Lancashire & Yorkshire Railway to augment the electric service between Manchester, Prestwich and Bury.

The Tramways & Light Railways Association recently made application to the Royal Commission on Paper that licenses be granted to paper manufacturers so as to insure to tramways and other bodies the full amount of their normal requirements in tickets. A reply has been received from the commission stating that it is unable to license a greater import on account of tramway tickets than two-thirds of the quantity of pulp imported in 1914. It adds that it can see no special need for discrimination, and that there are obvious methods of economizing in the production of such tickets. The council of the association has appointed a committee to deal with the matter further, and, in the meantime, recommends that wherever possible the size of tickets should be curtailed.

Owing to the paper shortage and in order to effect economies during the continuance of the war, the Underground Electric Railways, London, will discontinue the printing of pictorial posters for exhibition on its stations. This will mean that the many new and striking posters which adorned the stations will no longer be a familiar feature of the tubes, and the spaces originally occupied by these bills will in many cases remain blank. For some time past it has been increasingly difficult to spare members of the staff to do the necessary posting. For the present only essential notices relating to the working of the trains will be exhibited at the stations.

The increased workmen's fares on the Newcastle Corporation tramcars have come into operation. The increase has been put on the books of coupons, and in future all workmen and workwomen who do not tender coupon tickets will have to pay the full ordinary fare for the journey. With this regulation all cars hitherto labeled "workmen's car" will be abolished. The increase is 3d. on the shilling and 18d. books, and 2d. on the 6d. books.

The excellence of the management of the Liverpool Corporation tramways department is shown in statistics which have just been issued. From these it would appear that during May the receipts increased by £3,057, compared with the corresponding period of last year. The number of passengers carried shows an increase of 454,508. For the four and a half months since Jan. 1 the receipts increased £13,100, and the number of passengers increased 2,126,826, while the mileage run, by which a large saving has been effected, decreased by 55,636 car-miles.

Some time ago the Ilkeston Corporation received an offer from the Notts & Derbyshire Power Company, Ltd., to take over the tramways and electricity undertakings on certain terms. The tramways and electricity committee has passed a resolution recommending that the Town Council accept the terms offered. The Council, as a general purposes committee, after considering the matter in detail, has decided to sell the undertakings. The tramways were publicly opened in May, 1903. During that time there has been an annual loss of from £2,000 to £3,000, equal to a rate of from 6d. to 9d. in the pound. It is also recognized that a considerable expenditure is needed to put the track in better order, and that provision must be made for new cars.

The report of the British Electric Traction Company, Ltd., which owns and controls the majority of tramway companies operating in Great Britain, says that in view of the war and the increase in the cost of material and wages, and the difficulty of obtaining labor, the directors consider the improvement in revenue derived from investments is satisfactory. The general conditions have prevented the company from entering to any large extent upon new enterprises. The balance sheet this year is based on the scheme of reduction and rearrangement of capital which was recently adopted, and confirmed by the court, and which is put into effect in the accounts. The net profit of the company approaches £200,000, after paying debenture interest. The company was able to pay the 6 per cent on the preference stock and 3 per cent on the ordinary shares.

A. C. S.

NEWS OF ELECTRIC RAILWAYS

RAILWAY MEN QUICK TO MUSTER IN

Six Companies Lose 565 Men—Mr. Kealy Uses a Motorcycle and a Bugler in the Call to Arms

Electric railway men will share equally with their brothers from other walks of life in the work in Mexico if the anticipated break should come. Men from all departments of electric railway corporate life have prepared to leave for the front. A canvas of the entire industry in so short a time as that intervening between the order for mobilization and the publication of this article was obviously impossible, but the data so far secured with regard to the probable number of men from this industry and the attitude of the corporations employing them indicate a ready response and unusual willingness on their part to shoulder the burden, which in some instances required the quick readjustment of official duties and involved no small sacrifices. To cite a few instances of the men higher up, there is the loss to the companies of the services of Brig.-Gen. E. W. Hine, secretary of the Public Service Corporation of New Jersey, and the loss to the Kansas City Railways of the services of the president, Philip J. Kealy, who is lieutenant-colonel of the Missouri National Guard. Coming to the men in the ranks the instances of the depletion of the forces of the New York Railways, the Interborough Rapid Transit Company and the Public Service Corporation of New Jersey furnish criteria of some of the readjustments that have had to be made.

The New York Railways has lost fifty-six men from the transportation department, two clerks, eleven men from the car equipment department, ten men from the engineering department, two men from the motive power department, one man from the office of vice-president and general manager, six men from the law department, two men from the accounting department and one man from the payroll and register division. Until further action of the board of directors, the wages or salaries of all of these men will be continued and upon the termination of their service with the militia the employees will be reinstated so far as possible in their former positions.

The Interborough Rapid Transit Company has lost fifteen men from the train service on its elevated lines, one man from the superintendent's office, twelve men from the station department of the elevated lines, forty-five men from the subway division, thirteen men from the engineering department of the elevated lines, nine men from the engineering department of the subway division, thirteen men from the motive power department, thirty-one men from the car equipment department, two men from the accounting department, one man from the treasurer's department, one man from the purchasing department, one man from the law department and one man from the office of the vice-president and general manager. As in the case of the New York Railways, the wages and salaries of all of these employees will be continued until further action by the board of directors and upon the termination of their service the men will be reinstated as far as possible in their former positions.

About 100 employees of the railway, electric and gas companies included in the Public Service Corporation of New Jersey have been summoned to their respective camps for service. Of these fifty-three are from the Public Service Railway, twenty-one from the Public Service Gas Company and twenty-four from the Public Service Electric Company. Most of the men from the railway company are platform men. The directors of the corporation at their monthly meeting on June 20 resolved that all employees of the company who are full members of the National Guard called for service should receive their wages during the time they were engaged in military service and their positions be held open for them. The employees were instructed to file with the treasurer power of attorney, designating the person to whom the wages should be paid. The decision of the directors in this connection was an amplification of a com-

mittee report made before the Mexican situation resulted in calling out the men. The committee had approved paying the wages of the men who desired to attend the Plattsburg Camp or other military training camps under State or federal direction.

In Missouri, Mr. Kealy, previously referred to, found himself confronted with extraordinary conditions. When the call came for the Missouri National Guard it was discovered that the Third Regiment—Kansas City's regiment—was nearly 200 men short of its full quota. Col. Fred A. Lamb, in the militia twenty-seven years, was sick in bed. Mr. Kealy assumed command and took the regiment to Nevada, Mo. He then returned. Mr. Kealy saw his opportunity. He acted at once. The days of Paul Revere are gone, but his methods are still applicable. Mr. Kealy immediately engaged the rooms occupied by the committee that had tried to arrange a preparedness parade. The sign for the proposed parade was still up. He had a motor-cyclist, Ross Landes, bugle the call to arms. Mr. Landes did more than merely notify the citizenry that men were needed—he actually brought back twenty recruits in his Indian sidecar. Dr. E. M. Hiner, former leader of the old Third Regiment band, made some trips recruiting for the new band. Colonel Lamb resigned as colonel on June 26. The men of the regiment are unanimous in wanting Mr. Kealy to succeed him and lead the regiment to the border.

Last November Colonel Kealy was elected to his position in the Third Regiment, though he had not previously been connected with it. A practice hike was ordered for June 18 to Fairmount Park, 12 miles, and Colonel Kealy commanded on this trip. The orders to mobilize came while the regiment was in camp. Colonel Kealy's previous engineering training was said to be largely responsible for his ability to grasp the needs of the moment. He had had militia experience at the university. The citizens of Kansas City are grateful to Mr. Kealy for his service to the regiment. The prospect was that Kansas City would be found wanting when the call came for a regiment. The story of how Mr. Kealy raised the necessary recruits has just been told. He set the example to other employees by the showing that nearly forty men are going with the Third from the Kansas City Railways. The company will pay their wages while the men are gone, and will hold their jobs for them. Colonel Kealy has been performing his duties as president of the Kansas City Railways, spending two or three days a week in Kansas City, and being in constant touch by telephone with the offices while at Nevada.

About fifty of the employees of the United Railways & Electric Company, Baltimore, Md., are enrolled with the Maryland militia. Under date of June 21, William A. House, president of the company, transmitted to the heads of all departments the following official notice:

"It is the earnest wish of the United Railways & Electric Company that those of its employees who now belong to military organizations respond at once to the order for mobilization of troops on account of the Mexican situation, and we would make it plain to all national guardsmen who are in our employ that in no way will their positions be jeopardized by temporary absence in the discharge of their patriotic duty as American citizens. In confirmation, therefore, of verbal instructions this letter will authorize you to inform the employees of your department or division at once, that those who are now members of the State militia which has been called by the President of the United States, the Secretary of War, and the Governor of the State of Maryland, to the service of the country and to uphold the honor of its flag, will be paid their salaries during their absence, and upon returning will find their positions waiting for them."

Immediately following President Wilson's call of the Illinois State Militia for military service at the border, L. A. Busby, president of the Chicago Surface Lines, issued the following bulletin:

"Effective this date, all employees of the company who are now members of the state militia or naval reserve, and who are called into the military service of the United States will be given leave of absence while engaged in such service, and their positions will be held for them until mustered out. Until further notice, employees while engaged in such military service will continue to receive their present average amount of pay per month. This sum will be paid in semi-monthly installments, pursuant to written directions left by each employee with his department head." About 150 employees have joined the colors.

The Chicago Elevated Railroads, through Britton I. Budd, president, also announced that it would hold the positions of militiamen until they were mustered out, and would care for their dependent relatives on a liberal basis.

Among the announcements which have come to hand with respect to the electric railways and their employees in connection with service at the border, other than those previously noted, are the following:

All employees of H. M. Byllesby & Company, Chicago, Ill., who are members of the National Guard will receive full pay during their absence and their positions will be held for them.

All employees of the Illinois Traction Company, Peoria, Ill., who are members of the State Militia and are called out for service will have their positions held open for them and will not lose their present rating with the company.

The Connecticut Company, New Haven, Conn., announces that forty-seven of its employees are members of the Connecticut Militia, of whom thirty-four are conductors and motormen. Up to June 26 the company had not made any formal statement to the men, but expected to retain the positions for all who went to the border.

The Brooklyn (N. Y.) Rapid Transit Company announces that between 100 and 200 men would be called from its service and that all men would be kept on full pay for three months and if the service lasted longer than that the company would consider the problem again. It was also said that the rate of insurance carried under the Brooklyn Rapid Transit group insurance plan would not be affected. In serving their country the Brooklyn Rapid Transit employees will not lose their seniority rating, but will resume their jobs with the same standing of promotion as before.

The Rochester Railway & Light Company announced that any of its employees who belonged either to the National Guard or who wished to recruit for Mexican duty could do so and that their positions would be left open with full pay while they were away.

The Kentucky Traction & Terminal Company, Lexington, Ky., through F. W. Bacon, vice-president, announced that all men who enlisted would be reinstated in their former positions at the conclusion of their term of service.

Henry L. Doherty & Company, New York, N. Y., announce that all employees of the Cities Service Company and other Doherty public utility companies, including the Toledo Railways & Light Company, who are members of the National Guard will be allowed their full pay for three months' military service. A policy to provide for the families of such guardsmen, if their services are needed longer, will be announced later. All employees on the return from military service will receive their old places or positions equally remunerative.

The Terre Haute, Indianapolis & Eastern Traction Company and Indianapolis Traction & Terminal Company, Indianapolis, Ind., were the first employers in the State to go on record as to their employees who were members of the militia companies. A brief statement issued early on June 19 by Robert I. Todd, president of the Terre Haute, Indianapolis & Eastern Traction Company and Indianapolis Traction & Terminal Company, announced the action to be taken by these companies as follows: "Any employees of this company who are at present members of the National Guard, and called to service in connection with the Mexican troubles, will, until further notice, have their positions held open for them and wages continued."

The McGraw Publishing Company, Inc., publishers of the *ELECTRIC RAILWAY JOURNAL*, *Electrical World*, *Engineering Record*, *Metallurgical and Chemical Engineering* and *Electrical Merchandising*, announced that its employees who are members of the National Guard will be paid while away in the service of their country.

NASHVILLE-GALLATIN LINE PROPOSES 18.4-MILE EXTENSION

Plans are now practically complete for an extension of the Nashville-Gallatin Interurban Railway from Edenwold to Springfield, Tenn., a distance of 18.4 miles. Springfield is the county seat of Robertson County, and the center of a rich agricultural section. A stockholders' committee composed of H. H. Mayberry, James E. Caldwell, Clarence M. Clark, H. H. Corson, N. S. Keith and Norman McD. Crawford has been formed to arrange for the financing and construction of this extension and certain improvements to the present property of the company. It is proposed that a new company be organized that will own the enlarged system. The Nashville-Gallatin Interurban Railway has a capital stock of \$750,000 and has \$600,000 of 5 per cent first mortgage bonds outstanding. To make the proposed extension it is estimated that \$600,000 will be required, and an exchange of stock of the present company for that of the new company and in equal amount is being arranged among the stockholders, and new bonds will be issued to provide funds for the extension and improvements. The new bonds will be secured by mortgage on the present line and the extension to Springfield, and certain treasury stock will be held to be available for financing, if required.

If the deal is successful the E. W. Clark & Company Management Corporation will have charge of the construction. An agreement is also to be made with the E. W. Clark & Company Management Corporation for the operation of the combined lines. The length of the line from Nashville to Springfield will be 27 miles. It is to be electrically operated for the entire distance. All surveys have been completed and rights-of-way are now being secured. The First Savings Bank & Trust Company, Nashville, is depository for stock certificates and bonds of the present company pending the issuance of the certificates of the new corporation.

THIRD TRENTON ARBITRATOR AGREED UPON

Arbitration has begun between the Trenton & Mercer County Traction Corporation and the employees, with the selection of Clifton Reeves as the third arbiter. After several conferences between Peter E. Hurley, general manager of the company, and C. Howard Severs of the union, the situation became deadlocked. The names of more than two-score prominent business and professional men were submitted and turned down. Mr. Severs then named Mr. Reeves, and he was accepted by the company. On June 28 the three arbiters began going over each case. The conferences are being held daily in the city hall in Trenton.

Mr. Reeves is president of the Reeves-Cubberley Engine Company, Trenton, N. J., and has been a United States Commissioner of Conciliation for nearly two years. The most noted case in which he succeeded in bringing about an amicable adjustment of labor and capital differences was when the traffic clerks and telegraph operators of the New Haven Railroad threatened to strike. He worked with Patrick Gilday, chief conciliator of Pennsylvania's Department of Labor. Other cases in which Mr. Reeves acted with good results were the Westinghouse strike in Pittsburgh, in which he was the sole representative of the United States Department of Labor in this matter; the Providence street railway trouble, International Silver Company strike, New England Steamship Company strike, Lake Torpedo Company strike, Hindee Machine Company strike and the Cincinnati machine strike.

ARKANSAS ASSOCIATION OF PUBLIC UTILITY OPERATORS ELECT OFFICERS

Officers have been elected as follows for the Arkansas Association of Public Utility Operators to serve for the ensuing year: President, W. J. O'Brien, secretary-treasurer and manager of the Helena Gas & Electric Company, Helena, Ark.; first vice-president A. Patterson, general superintendent of the Southwestern Gas & Electric Company, Texarkana, Ark.; second vice-president, E. T. Reynolds, manager of the Arkansas Light & Power Company, Paragould, Ark.; secretary-treasurer, R. B. Fowles, auditor of the Pine Bluff (Ark.) Company.

ADDITIONAL DUAL SYSTEM LINE OPENED

On June 24 the New York Municipal Railway Corporation began the operation of trains over the New Utrecht Avenue elevated branch of the Fourth Avenue subway in Brooklyn. Complete operation of the new line was possible as far south as Sixty-second Street, where connection is made with the Sea Beach line, another Fourth Avenue subway branch. Beyond Sixty-second Street trains were operated over a single track as far south as the Eighteenth Avenue station. However, through operation was made and is to be continued from the Municipal Building in Manhattan south to the Eighteenth Avenue station. It is hoped to get the rest of the line in shape for operation during the late summer or in the coming fall. The New Utrecht Avenue line is a three-track elevated branch of the Fourth Avenue subway, leaving the latter at about Thirty-eighth Street, and running through the Thirty-eighth Street cut to New Utrecht Avenue, and thence over New Utrecht Avenue, Eighty-sixth Street and Stillwell Avenue to Surf Avenue, Coney Island. It is a city-owned line, and was built mainly over the right-of-way of the old West End line, which originally was a steam road, but in latter years has been operated as a rapid transit line by the Brooklyn Rapid Transit Company.

Since the signing of the dual system contracts on March 19, 1913, the following lines having been placed in operation: Interborough Rapid Transit Company lines—Queensboro subway, from station in Manhattan to Long Island City, opened June 22, 1915; Third, or express, tracks on Second, Third and Ninth Avenue elevated lines in Manhattan and The Bronx, complete operation began on Jan. 17, 1916.

New York Municipal Railway Corporation lines—Centre Street Loop, temporary operation began on Aug. 4, 1913; Fourth Avenue, Brooklyn, subway, Sea Beach railroad and completion operation of the Centre Street Loop commenced on June 22, 1915; extension of Fourth Avenue subway, Sixty-fifth to Eighty-sixth Street, on Jan. 15, 1916; extension of third, or express, track on Broadway, Brooklyn, elevated line from Havemeyer Street to Myrtle Avenue, commenced on Jan. 17, 1916; Service on Liberty Avenue elevated extension of Fulton Street, Brooklyn, elevated, inaugurated on Sept. 25, 1915; the Lutheran Cemetery extension of the Myrtle Avenue, Brooklyn, elevated line, placed in operation on Feb. 22, 1915.

WHITE CORPORATION TO MANAGE SHORE LINE

The J. G. White Management Corporation, New York, N. Y., has been retained as operating manager of the Shore Line Electric Railway System and the Norwich & Westerly Traction Company. The combined property operates 250 miles of interurban electric railway and serves all the towns and shore resorts on Long Island Sound east of New Haven, and continues the service from New London, Conn., through Westerly, R. I., to Watch Hill, Atlantic Beach, Weekapaug and other resorts on the Atlantic Ocean. The main line of the systems runs from New London north through Norwich, Conn., to Webster, Mass., and by connection with other lines reaches Worcester, Mass. In addition, city service is furnished in New London and Norwich, Conn., and several important lines radiate from each of these points.

Indiana's Last Horse Car to Go.—This year will mark the passing of the last horse car in Indiana. The old line in Brownstown, Ind., has been sold to allow for street improvements and modern transportation.

Illinois Traction Divides General Claim Department.—The general claim department of the Illinois Traction System, Peoria, Ill., was divided into two departments on July 1. The personal injury department will be removed from Springfield to Peoria in charge of G. R. Whitmore. The freight claim department will be retained at Springfield in charge of J. B. Hardaway.

Service Agreement at Pittsfield.—A new agreement has been signed by the Berkshire Street Railway, Pittsfield, Mass., and its employees. The men on the Berkshire division retain straight runs while those on the Pittsfield division can have straight time or relief as preferred. The men have been granted an advance in wages from \$2.85 to \$3 a day. The agreement is for one year from June 1.

Bond Issue Proposed for Transit in Cincinnati.—On June

20 the Cincinnati Rapid Transit Commission recommended to the rapid transit committee of the City Council the adoption of an ordinance providing for an issue of \$6,000,000 of 4½ per cent fifty-year bonds. This ordinance will probably be introduced at the next meeting of Council. Chief Engineer Krug has been authorized to contract for boring in Walnut Street to ascertain the nature of the material that will be encountered there.

Extension of Long Island Electric Zone to Babylon.—The engineers of the Long Island Railroad are at work on plans and estimates for the extension of the electric zone of the company from Lynbrook to Babylon along the south shore. This will add 19 miles to the 20 miles of road now electrically operated between the Pennsylvania Station and Lynbrook. It is expected that the plans for the electrification as prepared by the engineers will be ready for submission to the directors for action this winter with the prospect that if the extension is decided upon work will be begun next spring.

Chicago Traction Commission Funds Increased.—An additional appropriation of \$30,000 for the Chicago Traction & Subway Commission was authorized by the Chicago City Council at its regular meeting on June 19. The ordinance creating this commission, which is composed of Bion J. Arnold, Robert Ridgway and William Barclay Parsons, appropriated \$220,000 for the undertaking, and the additional appropriation increases this total amount to \$250,000. A recent progress report made by the commission to the local transportation committee indicated the scope of the investigation and the way in which the local transportation problem in Chicago is being analyzed.

Examination for Accounting and Statistical Clerk.—The United States Civil Service Commission announces an open competitive examination for accounting and statistical clerk, for men only, on Aug. 9 and 10. From the register of eligibles resulting from this examination certification will be made to fill vacancies as they may occur in the position of clerk in the division of carriers' accounts and in the division of statistics of the Interstate Commerce Commission, at salaries ranging from \$1,200 to \$1,620 per annum, and vacancies as they may occur in positions requiring similar qualifications. Applicants must have reached their twenty-first, but not their fortieth birthday on the date of the examination. High-grade experience for at least three years in accounting or statistical work in connection with railway or other common-carrier service is a prerequisite for consideration for this position. Experience with the Interstate Commerce Commission or with any of the state commissions engaged in the regulation of the affairs of common carriers will be accepted in lieu of similar experience in the service of railways, express companies, or other common carriers. Persons who desire to take this examination should apply at once to the United States Civil Service Commission, Washington, D. C., for Form 1312, stating the title of the examination desired.

Another Effort to Force Extensions in Seattle.—Councilman Oliver T. Erickson, of Seattle, Wash., has introduced a resolution into the City Council with a view of initiating proceedings whereby it may be determined by what right or power the Puget Sound Traction, Light & Power Company may be required to extend its lines. Mr. Erickson wants to know whether the company can be forced to make extensions, and it is to determine this that he proposed to call upon the legal department for an opinion as to the proper method to pursue in order to determine the question. A similar effort was made without result several years ago. At that time an ordinance was passed making it a misdemeanor for officials of the company to fail to extend the East Union line within a certain time. Several of the officials were arrested, but the cases against them were dismissed by the Superior Court. No appeal was ever taken by the city in these cases. Later, the city petitioned the Public Service Commission to order the extension of the company's line on Fourth Avenue South. The Public Service Commission held that it was without power to force the company to extend its lines. Still later, property owners along the Sixth Avenue Northwest line petitioned the Public Service Commission to order an extension of that line. The commission, however, held that it was without power to compel the company to make such extension.

Financial and Corporate

ANNUAL REPORTS

Republic Railway & Light Company

The comparative statement of income, profit and loss of the Republic Railway & Light Company, New York, N. Y., and its subsidiaries for the twelve months ended Dec. 31, 1914 and 1915, follows:

	1915	1914
Operating revenue	\$3,121,286	\$3,001,285
Operating expenses and taxes.....	1,874,082	1,856,467
Net earnings	\$1,247,214	\$1,144,818
Non-operating income	1,753	175
Gross income	\$1,248,967	\$1,144,993
Interest charges*	688,952	679,987
Net income	\$560,014	\$465,006
Dividends on preferred stock.....	311,484	311,484
Balance	\$248,530	\$153,522

*The interest figures for the respective years are in accordance with the accounts of the subsidiary companies and in 1914 include \$16,844 for interest on bonds held in the sinking funds. Beginning with 1915 this item is included in sinking fund payments instead of in the interest item. Therefore to put the column of increases on a comparative basis the items of interest, net income and balance are subject to adjustment by the amount of \$16,844.

Business activity in the territory served by the subsidiaries decreased to some extent during the early part of the year 1915, although not so notably as in other districts, owing to the diversification of industries located in their territory. During the latter part of the year conditions improved and are now prosperous. The earnings on the Youngstown railway lines also suffered somewhat from the competition of the jitney buses. This competition was never so severe in the district served by the company as in some parts of the country and is rapidly disappearing, owing partly to the fact that the operation was not as profitable as anticipated by the owners, and partly to the passage by the City Council of a regulatory ordinance which has been upheld by the courts.

Notwithstanding these adverse conditions the gross earnings increased \$120,012, or 4 per cent. Operating expenses and taxes, however, increased only \$17,616, or 0.95 per cent, so that the net earnings increased \$102,396, or 8.94 per cent. Owing to a marked increase in non-operating income, the gross income increased \$103,973, or 9.08 per cent. The net income gained \$95,008, or 20.43 per cent, and the balance after preferred dividends the same amount, or 61.88 per cent.

The combined properties of the company owned 170.9 miles of track at the end of 1915 as compared to 169.63 the year before. During 1915 they operated 7,497,489 car miles as compared to 7,341,971 in 1914, and carried 46,036,596 and 47,587,578 passengers respectively. During 1915 the light and power business of the subsidiaries increased 15.9 per cent.

The J. G. White Companies

According to the report of the J. G. White Companies, New York, N. Y., the amalgamated balance sheet as of Dec. 31, 1915, showed the following items: Assets—good-will, contracts, etc., \$1,515,540; securities owned and syndicate participations, \$2,512,245; bills receivable, less reserve for doubtful items, \$346,560; accounts receivable, less similar reserve, \$475,453; interest and dividends accrued, \$5,382; deferred charges and sundries, \$11,876; cash in banks and on hand, \$543,339, and working capital and cash in branch offices, \$10,621. Liabilities and capital—capital stock issued, \$4,290,900; bills payable, \$325,000; accounts payable, \$147,416; dividends payable, \$53,840, and surplus of undivided profits, \$603,862.

The companies during 1915 adhered strictly to their fixed policy of taking no large engineering or construction contracts except on a percentage or fixed-fee basis. During this period there undoubtedly was a considerable volume of rehabilitation and extension work in connection with the

enlargement of industrial plants brought about by the abnormal condition due to the European war, but practically no new enterprise involving large work along the usual lines that the companies had been identified with in the past was initiated, which made it impossible for the companies to secure work of this nature.

The companies, however, secured a considerable amount of purchasing for clients, which business developed into a large volume during the year owing in great part to the prevailing conditions in the European markets. It is believed that the connections made may produce a very satisfactory volume of business in this line even after the close of hostilities in Europe.

During the year there was liquidated for cash a large block of securities at very satisfactory profits over the balance sheet figures, which accounts in a large measure for the reduction in value of \$446,995 in securities owned.

The officers of the companies believe that with the continued increase in the industrial development now going on in this country and South America, conditions along the lines of the companies' usual endeavor should improve during the year. With the general unsettled political conditions throughout the world and uncertainties depending upon the outcome of the European conflict, however, it is very difficult to forecast the immediate future.

OPERATING RESULTS IN MANCHESTER, ENGLAND

The tramways committee of the Manchester Corporation has agreed to contribute £100,000 in relief of the rates, as it has done on two previous occasions, but to do this it is calculated that it will be necessary to take £10,865 from the reserve fund. This rate contribution was fixed by the City Council three years ago, and before another year passes a new arrangement will have to be made. The position of affairs is regarded by the committee as very serious. The large payments in respect of war service allowances are a very serious drain on the financial resources of the department. For the year ended March 31, 1915, the allowances amounted to £31,764. Last year the amount was £92,881, and for the current year it is thought the allowance will go up to £94,000, making a total in three years of £218,645. To meet these payments the committee has been obliged to transfer smaller sums each year to the reserve and renewals fund than it would have done in normal circumstances. For example, in 1915 the transferred sum was £48,614 less, and in the year just ended it was £78,000 less than it would have been in ordinary times. For the current year the committee will make no addition to the fund, instead of transferring £99,450 as it would wish to do. In three years the fund will be £226,922 less than it would otherwise have been under normal conditions. The general manager gives the total revenue, the car mileage, the revenue per car mile, and the number of passengers carried during the last three years as follows:

	1914	1915	1916
Total revenue	£925,310	£901,876	£939,416
Car miles run.....	19,463,646	19,155,051	18,486,440
Revenue per car mile.....	11.41d.	11.3d.	12.196d.
Passengers carried.....	205,608,741	202,768,420	209,853,344

The estimates for the current year are based upon an estimated car mileage of 18,500,000. They show that, after making provision for the payment of £100,000 to the city fund and meeting the extraordinary expenditure arising out of the war—namely, £94,000 for war service allowances, etc., and £40,000 income tax—the department will not be able to make any provision for renewals, and it is estimated that there will be an actual deficit of £10,865 in the revenue. It is proposed to meet this deficit by a transfer from the reserve and renewals fund.

Leading members of the Manchester Corporation recently met for the purpose of considering the question of traffic congestion in the principal streets of the city. The matter has been before the Corporation for several years. The tramway, watch and improvement committees have reported on the subject, and the City Council has long been awaiting the outcome of their joint deliberations. It was decided to appoint a special committee, consisting of the chairmen and deputy chairmen of the tramways, traffic congestion, watch, highways, infirmary old site, and improvement committees to consider the matter further and present a complete report to the Council.

Chicago City & Connecting Railways, Chicago, Ill.—A semi-annual dividend of \$1 was paid on July 1 on the 250,000 shares of preferred participating certificates of the Chicago City & Connecting Railways. This payment compares with 75 cents in January, 1916, and \$1.25 in July, 1915.

Choctaw Railway & Lighting Company, McAlester, Okla.—The plans for the reorganization of the Choctaw Railway & Lighting Company under the recent foreclosure and sale have not yet been fully completed. A bondholders' protective committee was formed last fall, and all but \$14,000 of the \$894,000 of first mortgage bonds were deposited with the Guaranty Trust Company, New York, N. Y., as depositary under a deposit agreement dated Sept. 15, 1915. On April 8, 1916, the property was bought in at foreclosure sale by C. N. Mason, Julius A. Trawick and Nathan S. Smyser, in trust for the bondholders' protective committee. On June 23 it was reported that the plan of the committee was to incorporate one or more companies to take over the property.

Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio.—Judge Murphy of the Common Pleas Court at Hamilton, Ohio, announced his decision on June 26 in the case of Albert D. Alcorn, Cincinnati, against the Cincinnati, Dayton & Toledo Traction Company. The court said that the company was insolvent and that there was evidence of a conspiracy to defraud bondholders. A receiver will be appointed to collect monthly receipts from the Ohio Electric Railway, which is operating the property under lease. At a meeting of the bondholders' committee of the Cincinnati, Dayton & Toledo Traction Company on the same day the decision of Judge Murphy was discussed. It is said that the company, through the committee, will carry the case to the higher courts. At the present time the Ohio Electric Railway is turning over the money collected from the operation of the road to this committee, which is making an effort to readjust the finances of the company.

Cleveland (Ohio) Railway.—The operating report of the Cleveland Railway shows that during May 32,004,274 passengers were carried, a gain of 12.32 per cent over the same month in 1915. The operating revenue for the month was \$809,262. After deducting the allowances, \$507,694, the net operating revenue was \$301,567. The net income was \$266,420 and the net surplus, \$48,820. This increases the interest fund to \$562,638.

Cumberland County Power & Light Company, Portland, Me.—A B. Leach & Company, New York, N. Y., are offering for sale \$825,000 of first lien and consolidated mortgage 5 per cent gold bonds of the Portland Railroad dated Nov. 1, 1915, and due on Nov. 1, 1945, making the total amount of this issue \$1,825,000. The present issue is to retire \$600,000 of 4½ per cent notes of the company due on Dec. 1, 1916, and to provide funds for additions and improvements. The bonds are a direct mortgage on the property of the Portland Railroad subject to an issue of first consolidated 3½ per cent gold bonds of which, however, \$1,400,000 are pledged as security for this issue, leaving a balance of only \$1,600,000 outstanding in the hands of the public. The company is operated under lease by the Cumberland County Power & Light Company for ninety-nine years from Feb. 1, 1912. The application of the company to the Maine Railroad Commission in connection with this issue was noted in the ELECTRIC RAILWAY JOURNAL of June 10, page 1108.

Mexico (Mex.) Tramways.—A joint meeting of the holders of the bonds issued by the Mexico Tramways, Mexican Light & Power Company, Ltd., the Mexican Electric Light Company, Ltd., and the Pachuca Light & Power Company will be held in London on July 14, to consider and decide upon the policy to be adopted for the protection of the bondholders' interests until conditions in Mexico improve. In order that the bondholders might have full information as to the present position of the company, F. H. Phippen, Toronto, Can., and E. D. Trowbridge, Detroit, Mich., recently visited Mexico in the interest of the bondholders at the request of the National Trust Company, Ltd., the trustee under the various trust deeds, and with the approval of the committee. On their return they made a report on the properties, with important recommendations. The general meeting on July 14 has been called to enable bondhold-

ers to meet Mr. Phippen and Mr. Rundle, the general manager of the National Trust Company, before these gentlemen are compelled to return to Canada. At the office of Bell & Schell, New York, the American agents for the Canadian Bank of Commerce, it was stated on June 28 that copies of the report and of the statement issued by the trust company were expected to be received from London on June 30.

Monmouth County Electric Company, Red Bank, N. J.—The interests that purchased the property of the Monmouth County Electric Company under foreclosure recently have applied to the New Jersey Board of Public Utility Commissioners for permission for the successor company to issue \$325,000 of stock.

Northern Ohio Traction & Light Company, Akron, Ohio.—At the hearing of the request of the Northern Ohio Traction & Light Company before the Public Utilities Commission on June 26 for authority to issue \$14,075,000 of bonds, Mayor Stolberg, representatives of the Chamber of Commerce and members of the City Council of Canton appeared and insisted that if this authority is granted, the company be required to spend \$300,000 on improvements and extensions in Canton. The company claims that Canton, with 21 miles of track, produces only one-third as much revenue as Akron, with 37 miles of track. The company planned to spend \$65,000 in Canton, but tentatively agreed to increase this to \$100,000. The commission will render its decision later.

Public Service Corporation of New Jersey, Newark, N. J.—A gain of nearly 10 per cent in total business for May, 1916, over May, 1915, is shown in a financial report of the Public Service Corporation of New Jersey. The increase amounted to \$361,250. For the five months ending May 31, the total increase in business was nearly \$2,000,000, on 13.3 per cent gain over the corresponding period of last year. The report for May, 1916, is as follows: Gross increase in total business, \$361,250; balance available—after payment of operating expenses, fixed charges, sinking fund requirements, etc.—for amortization, dividends and surplus, \$400,800; increase in surplus available for dividends over the corresponding month of 1915, \$48,291. The report for the five months ended May 31, 1916, is as follows: Gross increase in total business, \$1,960,485; balance available—after payment of operating expenses, fixed charges, sinking fund requirement, etc.—for amortization, dividends and surplus, \$1,963,766; increase in surplus available for dividends over the corresponding period of 1915, \$436,171.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo.—The St. Joseph Railway, Light, Heat & Power Company has applied to the Missouri Public Service Commission for authority to issue \$15,000,000 of thirty-year 5 per cent bonds, which, it is said, will be partly used to take up outstanding mortgages of \$5,000,000.

Seattle, Renton & Southern Railway, Seattle, Wash.—A deed to the Seattle, Renton & Southern Railway, by which the bondholders, who recently purchased the line at a receivers' sale, acquire title to the property, has been formally approved by Judge A. W. Frater in the Superior Court. The deed was signed by August Peabody and Burton Thomas as trustees for the committee representing the bondholders, who bid in the road at the up-set price of \$1,200,000. The physical property of the railroad was actually transferred to the new owners on June 10, and they have since been operating the line under Walter M. Brown, acting for President Marshall P. Sampsell. All that is left to be determined in the long litigation in which the company was involved is the compensation of Scott Calhoun and Joseph A. Parkin, the receivers. W. R. Crawford, in the Superior Court, has served notice of appeal from Judge A. W. Frater's order of June 17, directing the receivers to pay claims against the line amounting in the aggregate to about \$175,500. In a recent order Judge Frater directed the receivers to pay the Class "A," or first preferred claims against the road, and 50 per cent of the class "B," or second preferred obligations. The Seattle & Rainier Valley Railway was incorporated recently in Delaware with \$360,000 of stock presumably as the successor of the Seattle, Renton & Southern Railway.

United Light & Railways Company, Grand Rapids, Mich.—The board of directors of United Light & Railways Company has adopted a resolution amending the by-laws by adding thereto an additional by-law to provide for a finance committee, consisting of five directors, of whom the president of the company, ex-officio, shall be one. The other members of the finance committee shall be elected by the board of directors to hold office for a term of one year and until their successors are elected and qualified.

United Railroads, San Francisco, Cal.—M. B. Starring, president of the United Railways Investment Company, is in San Francisco, where he is holding a series of conferences with Jesse W. Lilienthal, president of the United Railroads, on new financing plans for the latter company.

United Railways & Electric Company, Baltimore, Md.—The United Railways & Electric Company arranged to retire at maturity on July 1 the \$500,000 of Baltimore, Catonsville & Ellicott Mills Electric Railway first mortgage 5 per cent bonds dated July 1, 1896. They were cared for under the terms of the indenture securing the first consolidated 4's of the United Railways & Electric Company.

Union Traction Company of Indiana, Indianapolis, Ind.—The Public Service Commission of Indiana has been partitioned by the Muncie & Portland Traction Company, the Indianapolis, New Castle & Eastern Traction Company and the Union Traction Company of Indiana to approve the details of a lease for 999 years of the property of the Muncie & Portland Traction Company to the Union Traction Company through the Indianapolis, New Castle & Eastern Traction Company. The Muncie & Portland Traction Company operates between Muncie and Portland. The company is capitalized at \$1,000,000, all common. It is proposed that this capital stock shall be made \$500,000 preferred and \$500,000 common. The Union Traction Company would guarantee to pay the holders of the preferred stock 2½ per cent semi-annually. In addition to this, the Union Traction Company would pay to the Muncie & Portland Traction Company the sum of \$2,265 semi-annually, and when the net income of the Union Traction Company amounted to \$191,320 a year or more, it would pay any excess to the Muncie & Portland Traction Company until \$17,370 had been paid. The payments in any one year under the lease, however, would not aggregate more than \$46,900, made up as follows: \$25,000 in guaranteed payments on the preferred stock; \$17,370 as the maximum excess payment, and the two payments of \$2,265 each made semi-annually.

West Penn Traction Company, Pittsburgh, Pa.—The West Penn Traction Company has declared an extra dividend of 3 per cent on the preferred stock, payable on Aug. 15 to stock of record as of Aug. 1 and an extra dividend of 3 per cent on the preferred, payable on Sept. 15 to stock of record as of Sept. 1. These dividends complete the payment of all accumulated dividends on this issue. The quarterly dividend of 1½ per cent was deferred on Sept. 21, 1914, and regular disbursements were not renewed until March 8 of this year. At that time an extra dividend of one-half of 1 per cent was paid on accumulated dividends. On May 19, 1916, a dividend of 2½ per cent was paid on the accumulated dividends. This makes a total of 9 per cent which has been paid on the back dividends of the preferred stock.

DIVIDENDS DECLARED

Bangor Railway & Electric Company, Bangor, Me., quarterly, 1¼ per cent, preferred.

Birmingham Railway, Light & Power Company, Birmingham, Ala., 3 per cent, preferred; 1 per cent, on account of accumulated preferred dividends.

Brooklyn (N. Y.) City Railroad, quarterly, 2 per cent.

Capital Traction Company, Washington, D. C., quarterly, 1¼ per cent.

Chicago City & Connecting Railways, Chicago, Ill., \$1, preferred participating certificates.

Chicago (Ill.) City Railway, quarterly, 2 per cent.

Cincinnati & Hamilton Traction Company, Cincinnati, Ohio, quarterly, 1¼ per cent preferred; quarterly, 1 per cent, common.

Cincinnati (Ohio) Street Railway, quarterly, 1½ per cent.

Columbus, Newark & Zanesville Railway, Springfield, Ohio, quarterly, 1½ per cent, preferred.

Halifax (N. S.) Electric Tramway, quarterly, 2 per cent.

Interstate Railways, Philadelphia, Pa., 30 cents, preferred.

Iowa Railway & Light Company, Cedar Rapids, Iowa, quarterly, 1¼ per cent, preferred.

New Orleans Railway & Light Company, New Orleans, La., quarterly, 1¼ per cent, preferred.

Omaha & Council Bluff Street Railway, Omaha, Neb., quarterly, 1¼ per cent, preferred; quarterly, 1 per cent, common.

Ottawa (Ont.) Traction Company, Ltd., quarterly, 1 per cent.

Philadelphia Company, Pittsburgh, Pa., quarterly, 87½ cents, common.

Philadelphia & Western Railway, Upper Darby, Pa., quarterly, 1¼ per cent, preferred.

Porto Rico Railways, Ltd., P. R., 1¼ per cent, preferred.

Public Service Corporation of New Jersey, Newark, N. J., quarterly, 2 per cent.

Republic Railway & Light Company, Youngstown, Ohio, quarterly, 1½ per cent, preferred.

Scioto Valley Traction Company, Columbus, Ohio, quarterly, 1¼ per cent first preferred, quarterly, 1¼ per cent preferred.

Stark Electric Railroad, Alliance, Ohio, quarterly, 1 per cent.

Toronto (Ont.) Railway, quarterly, 2 per cent.

United Gas & Electric Corporation, New York, N. Y., quarterly, 1¼ per cent, first preferred.

Washington Water Power Company, Spokane, Wash., quarterly, 1 per cent.

West End Traction Company, Pittsburgh, Pa., 3 per cent extra, preferred; 3 per cent, on account of accumulated preferred dividends.

York (Pa.) Railways, 2½ per cent, preferred.

ELECTRIC RAILWAY MONTHLY EARNINGS

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.						
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income	
1m., May, '16	\$174,517	\$114,811	\$59,706	\$41,711	\$17,995	
1 " " '15	165,033	114,124	50,909	39,078	11,231	
11 " " '16	1,793,309	1,152,800	640,509	449,541	190,968	
11 " " '15	1,818,854	1,175,488	643,366	438,487	204,879	

CITIES SERVICE COMPANY, NEW YORK, N. Y.						
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income	
1m., May, '16	\$709,085	\$20,113	\$688,972	\$44,121	\$644,851	
1 " " '15	287,365	14,358	273,007	40,834	232,173	
12 " " '16	6,012,968	201,343	5,811,625	503,454	5,308,171	
12 " " '15	3,952,799	143,095	3,809,704	478,333	3,331,371	

DALLAS (TEX.) ELECTRIC COMPANY						
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income	
1m., April, '16	\$151,269	\$96,674	\$54,595	\$36,597	\$19,998	
1 " " '15	131,945	85,308	46,637	33,394	13,243	
12 " " '16	1,870,966	*1,152,216	718,750	417,656	\$310,294	
12 " " '15	2,062,879	*1,182,824	880,055	396,994	483,061	

EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.						
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income	
1m., April, '16	\$62,995	\$34,387	\$28,608	\$8,864	\$19,744	
1 " " '15	50,669	*29,484	21,185	8,728	12,457	
12 " " '16	773,901	*403,133	370,768	105,766	265,002	
12 " " '15	669,127	*389,106	280,021	103,868	176,153	

FORT WAYNE & NORTHERN INDIANA TRACTION COMPANY, FORT WAYNE, IND.						
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income	
1m., April, '16	\$138,186	\$83,189	\$54,997	\$53,237	\$1,760	
1 " " '15	135,938	80,430	55,508	53,257	2,251	
4 " " '16	558,277	334,433	223,844	215,201	\$9,643	
4 " " '15	566,280	324,465	241,815	213,871	\$27,944	

HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.						
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income	
1m., April, '16	\$27,765	*\$14,389	\$13,376	\$5,453	\$7,923	
1 " " '15	21,850	*11,812	10,038	5,581	4,457	
12 " " '16	298,288	*164,925	133,363	66,131	67,232	
12 " " '15	267,496	*173,886	93,610	66,805	26,805	

PENSACOLA (FLA.) ELECTRIC COMPANY						
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income	
1m., April, '16	\$23,391	*\$12,657	\$10,734	\$7,678	\$3,056	
1 " " '15	20,472	*11,433	9,039	7,201	1,838	
12 " " '16	271,383	*150,630	120,753	87,617	33,136	
12 " " '15	253,353	*159,167	94,186	86,982	7,204	

TAMPA (FLA.) ELECTRIC COMPANY						
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income	
1m., April, '16	\$78,959	*\$44,595	\$34,364	\$4,394	\$29,970	
1 " " '15	81,176	*42,739	38,437	4,376	34,061	
12 " " '16	987,491	*515,777	471,714	52,221	419,493	
12 " " '15	993,777	*510,893	482,884	52,988	429,896	

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.						
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income	
1m., May, '16	\$849,056	\$515,264	\$333,792	\$145,206	\$188,586	
1 " " '15	791,472	499,382	292,090	144,120	147,970	
5 " " '16	4,156,224	2,631,142	1,525,082	713,387	811,695	
5 " " '15	3,833,818	2,544,656	1,289,162	702,038	587,124	

*Includes taxes. †Includes non-operating income.

Traffic and Transportation

RAILWAY ATTEMPTS JITNEY SERVICE

Five Jitney Buses Operated by the Bakersfield & Kern Electric Railway in Bakersfield, Cal., Pile Up \$7,000 Loss in Seven Months

The Bakersfield & Kern Electric Railway, Bakersfield, Cal., in order to compete with private jitney buses, and by way of providing temporary transportation beyond certain of its electric lines, has been operating an automobile service since last October. Five Ford cars were used. Each was equipped with a twelve-passenger bus body with longitudinal seats. Two of these were put on the Baker Street run, two on Niles Street, and one on the West Park extension. In each case the operator was paid motorman's wages and the passengers were transferred to and from the electric lines of the company at convenient points.

The figures given in the accompanying table show the mileage traveled each month on each route, and it is notable that the greater the mileage in each case, the greater the deficit for the line. The operating expense includes wages of operator, maintenance and operating costs, as well as depreciation and interest on the investment. The income is the total cash fares received on the buses. This does not represent the number of passengers hauled, as those who transferred from electric cars to buses would not, of course, swell the bus receipts.

Baker Street Run (Two Buses)	Revenue Mileage	Revenue	Operating Expense	Loss
October, 1915.....	1,812	\$39.55	\$140.88	\$101.33
November, 1915.....	4,239	79.95	349.63	269.68
December, 1915.....	4,209	106.80	297.78	190.98
January, 1916.....	5,877	199.15	498.45	299.30
February, 1916.....	7,839	299.70	766.08	466.38
March, 1916.....	8,417	337.30	792.89	455.59
April, 1916.....	8,134	364.05	751.32	387.27
Total	40,527	\$1,426.50	\$3,597.03	\$2,170.53
Niles Street Run (Two Buses)	Revenue Mileage	Revenue	Operating Expense	Loss
October, 1915.....	2,278	\$52.45	\$177.11	\$124.66
November, 1915.....	5,340	108.20	440.44	332.24
December, 1915.....	5,569	162.00	394.07	232.07
January, 1916.....	7,753	281.65	657.63	375.98
February, 1916.....	10,704	452.00	1,046.05	594.05
March, 1916.....	11,348	476.60	1,068.90	592.30
April, 1916.....	10,980	507.00	1,014.22	507.22
Total	53,972	\$2,039.90	\$4,798.42	\$2,758.52
West Park Run (One Bus)	Revenue Mileage	Revenue	Operating Expense	Loss
October, 1915.....	4,915	\$133.10	\$382.07	\$248.97
November, 1915.....	5,500	167.55	453.58	286.03
December, 1915.....	5,933	194.70	419.76	225.06
January, 1916.....	5,933	192.50	503.29	310.79
February, 1916.....	5,556	202.70	543.04	340.34
March, 1916.....	5,928	228.90	558.47	329.57
April, 1916.....	5,771	239.35	532.72	293.37
Total	39,536	\$1,358.80	\$3,392.93	\$2,034.13
Total for five buses.....	134,035	\$4,825.20	\$11,788.38	\$6,963.18

HEARING ON JULY 5 ON COMPANY'S REPLY IN ROCHESTER JITNEY CASE

A conference between representatives of the New York State Railways and the Public Service Commission for the Second District of New York has been set for July 5, at Albany, for the discussion of the details through which the company will comply with certain of the orders of the commission contained in the recent denial of the Rochester jitney certificates. At the request of the Chamber of Commerce the company and the commission will not discuss any structural changes until the Chamber has completed the study it is making of this problem. The features of the commission's order which will be discussed at the coming conference are as follows: Private telephone system, emergency trucks, electric switches, additional seats to be furnished, periodical checks of travel to be made, operation of crosstown bus lines, improvements in service to and from Fairport, and improvements in conditions at the State Street carhouse.

These topics have been arranged after a comparison between the commission's order and the company's formal and tentative answer filed at the required thirty days after the

order. It is understood that the company in this answer has substantially offered to comply with all of the commission's recommendations aside from those which require new construction, but that in some instances it has claimed that the requirements are already fulfilled or might better be filled by modifications of the commission's plans.

The operation of the crosstown bus lines is typical of these cases. The company is understood to have suggested this as a substitute for the crosstown line recommended by the commission which will be impossible to build until a new bridge is erected across the river near Driving Park. A bus line, the company has said, could use the present bridge. Such a bus line, run as a part of the electric railway system, would afford transfers to the other lines, and generally fit in better with the present facilities than independent jitneys. None of the applicants for jitney certificates had applied for a route on this line or any like it.

PITTSBURGH RAILWAYS INCREASE OWL FARE

At midnight on June 22 the Pittsburgh (Pa.) Railways put into effect a 10-cent fare on its owl cars. This is an increase of 5 cents over the previous fare for this service, and is the first of the changes made by the company to secure additional revenue, growing indirectly out of the settlement of the strike of the employees of the company in May. It was upon condition that the company would receive the co-operation of the mediators in the strike in securing necessary additional revenue that it consented to pay an advance in wages greater than its present earnings would permit. The company said at that time that it desired it distinctly understood that if it was to pay the wages demanded, it would be necessary to provide increased fares partially to cover the advance to the men and that action would be taken for such adjustments of the fare zones as were deemed proper and reasonable. In announcing the increase in the owl fares the company posted placards in its cars which read as follows: "The old rate of night fare will be re-established on Thursday morning, June 22, namely, double the day fare. This action becomes necessary because of the abnormal increase in the price of labor and materials."

Opposition to the increase in the fares developed at once. A committee of the Council of Pittsburgh dispatched a messenger to Harrisburg with a resolution to the Public Service Commission in which protest was made against the action of the company. The Public Service Commission on the afternoon of June 23 made an order requiring the company to issue certificates of rebate to be redeemed in case the commission decided that the increase in rates should not stand. Accompanying this decision was the announcement that the commission had set Friday, June 30, at 10 a. m. for a hearing at the Capitol on all of the questions involved in the complaint against the company.

One-Man Cars for Bristol.—The Bristol (Tenn.) Traction Company has completed the conversion of most of its cars for one-man operation and has installed the one-man system except on one route.

Advertising Campaign Started in Denver.—The *Tramway Bulletin*, published by the Denver (Col.) Tramways, announced in the June issue that the company has started on the first of several newspaper advertising campaigns "to let Denver people know about their own town."

Accident on Pennsylvania Road.—Three persons were killed and a number of others were seriously injured on June 23 when a freight car of the Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., crashed into the rear end of a heavily-loaded passenger car at North Sewickley, near Elwood City.

Restrictions on Packages in Kansas City.—A new order by W. C. Harrington, superintendent of transportation of the Kansas City (Mo.) Railways, prohibits the carrying of passengers with bundles too large to hold in the hand or store under the feet. The order also prohibits trainmen from carrying bundles of the proscribed sizes.

Sale of Low-Fare Tickets Abolished.—The Indiana Public Service Commission has abolished the issuance of fifty-four-cent tickets for \$2.15 on the Gary & Interurban Railroad between Gary and Indiana Harbor, Ind. This service was

on the basis of 1¼ cents per mile between the two cities. The fare was considered too low by the commission.

Traveling Instructors With a Roving Commission.—The transportation department of the Kansas City (Mo.) Railways has added two traveling instructors, a motorman and a conductor, who spend all their time on the cars, on special assignments to certain men, following up the work of the school of instruction, or in observing the men, and giving suggestions.

Decrease in All Except Auto Accidents in Brooklyn.—Gen. George W. Wingate, president of the Brooklyn Institution of Safety, has issued to 10,000 automobile owners in the borough of Brooklyn a letter calling attention to the fact that while other classes of street accidents have shown very encouraging decreases in the first four months of 1916 as compared with the first four months of 1915, accidents in which automobiles were involved have not only failed to show similar decreases, but on the contrary have tended to increase largely.

Massachusetts Court Dismisses Fare Case.—The Massachusetts Supreme Court has dismissed a bill brought by the town of Arlington against the Bay State Street Railway to restrain the latter from carrying into effect a schedule providing for an increase of fares. The town claimed that the company was bound by the agreement with the Arlington & Winchester Street Railway when it received a location in 1897 that a charge of not more than 5 cents should be made to any point in either town. The court holds that the matter is entirely within the jurisdiction of the Public Service Commission.

Experimental Operation With New Cars Authorized.—The City Council of Seattle, Wash., has passed an ordinance authorizing the experimental operation of light-weight cars on the Summit Avenue line of the Puget Sound Traction, Light & Power Company. Trials will begin on or about July 5 and will continue until the company and public officials are convinced that the cars are practical, useful, economical and safe, or that they are lacking in these qualities. If the experiments are counted a success, the company plans to install this new type of car on various routes where they will be the most practical.

Spokane Service Readjustments Arranged.—According to officials of the Washington Water Power Company and the Spokane & Inland Empire Railway, Spokane, Wash., the readjustment of the street railway schedules for owl service will be made soon after July 1. D. L. Huntington, president of the Washington Water Power Company, states that the Public Service Commission has asked for considerable additional data in connection with the hearing on June 9 and 10, reported in the ELECTRIC RAILWAY JOURNAL of June 24, page 1205. This information is being prepared. Mr. Huntington states that the service adjustment in all probability will be in operation by July 15. He said: "I believe that we can work out a schedule which will cover the city adequately and at the same time offer a measure of relief for the companies." Under the new schedules there will be no duplication of service in the owl lines; where parallel lines are operated by both companies at this time, the field will be divided and the district served by one or the other line.

Service Standard Rules in Effect in Baltimore.—The United Railway & Electric Company, Baltimore, Md., recently advised the Public Service Commission of Maryland that beginning on June 15 it would issue transfers upon transfers on the Woodlawn branch of the North Avenue line. This is designed to give a 5-cent fare to persons traveling from the territory north of North Avenue served by the St. Paul Street and parallel lines, to the Electric Park section. The rules prescribed recently for the company by the commission went into effect on June 15 with the exception of the one requiring "full-car" signs upon cars loaded to capacity and that forbidding passengers to stand upon the running boards of cars. These rules become effective on July 15. The rule restricting overloading provides that except during rush hours there shall be an average of a seat for every passenger. The rush hours are from 6 a. m. to 9 a. m., 4 p. m. to 7 p. m., and from 1 p. m. on Saturdays, Sundays and holidays. During the rush hours the cars may carry, in addition to seating capacity, one passenger for each 3 sq. ft. of clear floor space.

Personal Mention

S. W. Reynolds has resigned as general claim agent of the Illinois Traction System at Springfield, Ill.

J. B. Hardaway, an attorney in the general claim department of the Illinois Traction System, has been appointed head of the freight claim department, with offices in Springfield, Ill.

Walter N. Walmsley has been appointed general manager of Alabama Power Company, a subsidiary of Alabama Traction, Light & Power Company, New York, N. Y., to succeed F. H. Chamberlain, resigned.

G. R. Whitmore, an attorney in the general claim department of the Illinois Traction System, has been given charge of the personal injury claim department. His headquarters will be moved to Peoria, Ill.

Edward Ostrander, assistant secretary of the Public Service Commission of Oregon, has been appointed secretary of the commission to succeed H. H. Corey, who has been made a member of the commission.

W. B. Miser, general superintendent of the Jacksonville Railway & Light Company, Jacksonville, Ill., has been appointed supervisor of new business for all gas and electric properties of the Illinois Traction Company, Peoria, Ill.

W. S. Brackett, storekeeper of the Denver (Col.) Tramway, has been appointed purchasing agent of the company to succeed C. F. Musgrove, resigned. Mr. Brackett has been in the company's employ more than sixteen years.

J. J. Bonfield, for twelve years local freight agent for the Kentucky Traction & Terminal Company at Lexington, Ky., has been promoted to the position of general freight agent, succeeding John D. Sallee, who has retired to private life, as noted elsewhere in this column.

V. A. Gillette, dispatcher of the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway, South Bend, Ind., has been appointed local superintendent to succeed L. E. Hollar, who has been advanced to superintendent of transportation.

L. E. Hollar, local superintendent of the Chicago, South Bend & Southern Indiana Railway and the Southern Michigan Railway at South Bend, Ind., has been appointed superintendent of transportation of the companies succeeding F. I. Hardy, who has been made general manager.

Irwin M. Ristine has been appointed supervisor of employment of the Denver (Col.) Tramway. Mr. Ristine has been educational secretary of the Denver Y. M. C. A. schools for the last year and a half. Before that he was office and employment manager of the firm of Sears, Roebuck & Company, Chicago.

James M. Smith, secretary of the Cleveland & Erie Railway, Girard, Pa., has been appointed acting manager of the company to succeed R. W. Palmer, whose appointment to the Auburn & Syracuse Electric Railroad, Auburn, N. Y., was announced in the ELECTRIC RAILWAY JOURNAL of June 24.

C. F. Musgrove, who has been purchasing agent for the Denver (Col.) Tramway since Jan. 1, 1897, has resigned. Mr. Musgrove entered the company's employ in February, 1888, as secretary to William G. Evans, president at that time, and, after nine years in this capacity, was made purchasing agent.

C. D. Emmons has resigned as general manager of the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway, South Bend, Ind., effective on July 1, to accept the position of second vice-president and general manager of the Boston & Worcester Street Railway, with offices at Framingham, Mass.

F. I. Hardy, superintendent of transportation of the Chicago, South Bend & Northern Indiana Railway and the Southern Michigan Railway, South Bend, Ind., has been appointed general manager of the company, succeeding C. D. Emmons, whose appointment to the Boston & Worcester Street Railway is announced elsewhere in this column.

E. H. Gray, superintendent of the Illinois Traction System properties at El Paso, Ill., and contiguous territory, has been appointed general superintendent of the Jacksonville Railway & Light Company, Jacksonville, Ill., effective on July 1, to succeed **W. B. Miser**, made supervisor of new business of the McKinley properties.

J. C. Donald has resigned as general superintendent and purchasing agent of the Asheville Power & Light Company, Asheville, N. C., effective on July 1 to accept the position of assistant to the vice-president and general manager of the Ironwood & Bessemer Railway & Light Company, with headquarters at Ashland, Wis. Mr. Donald was born in Conecuh County, Ala., on Nov. 16, 1876. He was educated in the public schools of Columbia, S. C. He entered railway work with the wire and conduit department of the Boston (Mass.) Elevated Railway, with which he was connected for five years. He then served for a year in the electrical equipment department of the Pittsfield works of the General Electric Company. He was next connected with the Southern Railway & Light Company, Natchez, Miss., for a year as electrical engineer and superintendent of the company. Subsequently he served for a year as superintendent of the Citizens' Light, Heat & Power Company at Montgomery, Ala. He then re-entered railway work and served for two years as foreman of electrical construction for the Chattanooga Electric Company and Chattanooga Railway & Light Company, Chattanooga, Tenn. He has been connected with the Asheville Power & Light Company for the last five years as electrical engineer, general superintendent and purchasing agent.



J. C. DONALD

H. H. Corey has been appointed to the Public Service Commission of Oregon to succeed **Clyde A. Aitchison**, who resigned to become solicitor to the National Association of Railroad Commissioners. Mr. Corey has been secretary of the commission and at the May primary was nominated as the Republican candidate for commissioner from the eastern Oregon district.

John D. Sallee has resigned as general freight agent of the Kentucky Traction & Terminal Company, Lexington, Ky., and will retire from active business life. Mr. Sallee had been connected with the company at Lexington for more than twenty-six years. He has been general freight agent of the company since the fall of 1911. Previous to that he was superintendent of the lines of the company in Frankfort for six years. Before going to Frankfort he was dispatcher in Lexington for seven years. As general freight agent of the company, Mr. Sallee had supervision over the Frankfort terminal and also looked after the terminals at Paris, Georgetown and Nicholasville.

N. E. Drexler has been appointed chief engineer of the Newport News & Hampton Railway Gas & Electric Company, Hampton, Va., to succeed **C. D. Porter**, resigned. Mr. Drexler is a graduate of the Rensselaer Polytechnic Institute, Troy, N. Y. Since graduation he has been with the Newport News & Hampton Railway, Gas & Electric Company as assistant engineer, master mechanic, assistant chief engineer and assistant superintendent of transportation. For the last three months he was acting electrical engineer for the Maryland Electric Railways with headquarters at Annapolis, Md. As stated in the *ELECTRIC RAILWAY JOURNAL* of June 10 Mr. Porter has been appointed general manager of the Maryland Electric Railways.

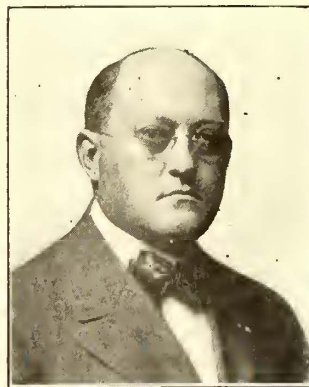
William R. Willcox, former chairman of the Public Service Commission for the First District of New York, was named on June 27 as chairman of the Republican National Committee to direct the campaign of **Mr. Hughes**. Mr. Willcox was the first chairman of the Public Service Commission in New York to which he was appointed during the

administration of **Mr. Hughes** as Governor of New York. He was formerly postmaster of New York. Mr. Willcox was born in Smyrna, N. Y., fifty-three years ago. It was while Mr. Willcox was chairman of the commission that the plans were developed for the dual rapid transit system now under construction in New York. This is the largest single municipal undertaking in the history of the world.

John Weigel has resigned as chief of the time-table department of the Brooklyn (N. Y.) Rapid Transit System to become superintendent of schedules for the International Railway, Buffalo, N. Y. Mr. Weigel will also give part of his time to supervising the schedules of the southern properties of the United Gas & Electric Corporation, which controls the International Railway. Mr. Weigel's electric railway career began twenty years ago, when he entered the shops at Brooklyn. He soon was transferred to the transportation department, serving successively as inspector, chief inspector, assistant superintendent and chief of the time-table department. The Brooklyn Rapid Transit System was one of the first roads to inaugurate scientific schedule making. Largely under Mr. Weigel's direction practices were developed in Brooklyn that have since served as models for many other city railways.

Charles A. Drew has been appointed superintendent of the time-table department of the Brooklyn (N. Y.) Rapid Transit Company to succeed **John Weigel**, resigned, whose appointment to the International Railway is noted elsewhere in this column. Mr. Drew was born in Bloomfield, N. J., thirty-eight years ago. He started railroading on Sept. 26, 1894, with the Newark (N. J.) Passenger Railway and continued with that company until June 1, 1900. At first he acted as a conductor and as a dispatcher. He was later promoted to the auditing department of the company, where he served from 1897 to 1900. On June 11, 1900, Mr. Drew entered the service of the Brooklyn Rapid Transit Company as a motorman. He worked in that position until the latter part of 1901. He was then made starter. In February, 1902, he was advanced to office dispatcher. He held that position until Nov. 1, 1907, when he was made depot master at East New York. He continued as depot master there until March 1, 1916. He was then made schedule maker in the main office, and on June 1, 1916, was appointed superintendent of the time-table department, the title of the head of the department being changed from chief to superintendent.

James P. Barnes, who was honored on Wednesday of this week by election to the presidency of the New York Electric Railway Association, has been prepared for the responsibilities of this office by active committee work in this and the American Electric Railway Association, and by the extension of his acquaintance with the railways and railway men of the State and country. His interest in the big problems of the industry is indicated by the report on compensation insurance presented at this week's meeting and to be printed in a later issue of the *ELECTRIC RAILWAY JOURNAL*, and by his two years' work on the equipment committee of the Engineering Association during which he devoted his



J. P. BARNES

energies to the steel wheel and other specifications. Mr. Barnes has been identified with the Allen & Peck properties for four years past, having resigned the position of chief engineer of the Syracuse (N. Y.) Rapid Transit Railway to become general manager first of the Syracuse & Suburban Railway, and later of the Buffalo, Lockport & Rochester Railway, the position which he now occupies. Since graduating from the Massachusetts Institute of Technology, Mr. Barnes has occupied several positions in succession, in each of which he has demonstrated marked technical and executive ability.

Construction News

Construction News Notes are classified under each heading alphabetically by States.

An asterisk (*) indicates a project not previously reported.

RECENT INCORPORATIONS

Central Florida Interurban Railway, St. Cloud, Fla.—Incorporated to construct about 300 miles of electric railway. Capital stock, \$100,000. Carl E. Carson, president, and William S. Alyea, secretary. [June 10, '16.]

Tampa & Eastern Traction Company, Tampa, Fla.—A charter has been granted to the Tampa & Eastern Traction Company to construct a line from Tampa to Lakeland, about 33 miles. Capital stock, \$750,000. Officers: F. W. Cole, president; E. J. Binford, vice-president; Frank L. Cooper, secretary, and F. M. Williams, treasurer, all of Tampa. [May 27, '16.]

***Seattle & Rainier Valley Railway, Seattle, Wash.**—Incorporated in Delaware presumably as the successor of the Seattle, Renton & Southern Railway, the property of which was sold recently under foreclosure and purchased by the representatives of the bondholders. Capital stock, \$360,000.

FRANCHISES

Santa Monica, Cal.—The Pacific Electric Railway has refused the offer of the city of Santa Monica for a franchise over Montana Avenue from Third Street to Fourth Street and north on Fourth Street to San Vicente Boulevard in exchange for removing its tracks from Ocean Avenue, north of Santa Monica Boulevard.

Quincy, Ill.—The Quincy Railway has asked the Council for a franchise to construct a loop from near the southwest corner of Twenty-second and Washington Streets to the terminus of the branch of the State Street line.

Russellville, Ky.—The Tennessee & Kentucky Interurban Railroad has received a franchise from the Council to construct a line into Russellville. The company plans to construct a line from Nashville to Russellville. Paul D. Denton, Nashville, secretary. [May 20, '16.]

Buffalo, N. Y.—The International Railway has asked the Council for a franchise to construct an extension through Franklin Street from Chippewa to Allen Streets.

Astoria, Ore.—It is reported that the Pacific Power & Light Company has decided to surrender all rights to operate street cars in upper Astoria. It is stated upon the refusal of the company to construct lines under the new franchise, an ordinance will be introduced in the Council at an early date revoking the privileges of the franchise granted last year.

Oregon City, Ore.—The Portland Railway Light & Power Company has received a freight franchise from the Council of Oregon City. The life of the franchise will be ten years instead of twenty-five, as originally proposed.

Walla Walla, Wash.—The Walla Walla Valley Railway has asked the City Commissioners to submit to a vote of the people the matter of a franchise for a street railway line out Ninth Street to the city limits. The company plans the construction of a line to the south and west of the city limits, also a branch line to the fair grounds. The company also wants permission to operate a freight train over the line any hour of the day.

TRACK AND ROADWAY

Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala.—This company is fixing up its property about half-way between Tuscaloosa and Holt for a picnic grounds and park and is erecting a dancing pavilion and large swimming pool.

***Duncan, Ariz.**—The Carlisle Mining Company plans to construct an electric railway from Duncan to its mines at Steeplerock, N. M., 13 miles. H. K. Welch, Steeplerock, manager.

Pacific Electric Railway, Los Angeles, Cal.—It is reported that this company will extend its line from Los Angeles to San Diego via Fullerton, Anaheim and Santa Ana.

Martinez & Concord Interurban Railway, Martinez, Cal.—Contracts will be let at once by this company for construction work on Pine Street and Pacheco Avenue, Martinez, in connection with its proposed line between Martinez and Concord. Clifford McClellan, San Francisco, is interested. [June 17, '16.]

San Francisco-Oakland Terminal Railways, Oakland, Cal.—The Railroad Commission of the State of California has issued an order authorizing the San Francisco-Oakland Terminal Railways to abandon a part of its double track on Fifth Avenue, Oakland.

San Diego (Cal.) Electric Railway.—This company is constructing 1¾ miles of single track from its Point Loma line at Roseville to the Government Reservation line at La Playa.

Pensacola, Fla.—The House of Representatives has passed a bill authorizing George H. Hervey of Pensacola to construct and operate an electric railway on the Fort Barrancas and Fort McRae military reservations. The bill had already passed the Senate. [Feb. 19, '16.]

***St. Petersburg, Fla.**—It is reported that plans are being considered for the construction of an electric railway from St. Petersburg to Tampa, about 20 miles, including a bridge 3½ miles long over Old Tampa Bay. George Gandy, Sr., and Lewis B. Brown, St. Petersburg, are interested.

***Charleston, Ill.**—A project to construct a line from Charleston to Terre Haute is being considered. J. W. Dawson, Westfield, is interested.

Danville Street Railway & Light Company, Danville, Ill.—This company has begun work on the west approach to the Fairchild Street subway. Grading and laying of ties are now in progress. The company has also received a new switchboard for installation in connection with this subway. It is expected that work will be completed by Aug. 1.

Kankakee & Urbana Traction Company, Urbana, Ill.—Regular passenger and freight service was installed on this company's line between Urbana and Paxton on June 28.

Union Traction Company, Anderson, Ind.—This company is making extensive repairs to its tracks at Marion, the work beginning at the bridge in Washington Street and progressing northward.

St. Joseph Valley Railway, Elkhart, Ind.—This company is seeking permission from property owners to string wires supporting the trolley wires from the buildings, thus doing away with poles on Main Street from Hickory Street to Jefferson Street.

Arkansas Valley Interurban Railway, Wichita, Kan.—This company has awarded a contract to the Topeka Bridge & Iron Company for the construction of a concrete bridge consisting of two 65-ft. arches over Land Creek. The cost is estimated at \$4,250.

Duluth-Superior Traction Company, Duluth, Minn.—The formal order was issued by the Railroad Commission of Wisconsin on June 21, rescinding the order of the commission of Nov. 13, 1912, under which the Duluth-Superior Traction Company was required to reduce fares in Superior. Reference was made to this order in the *ELECTRIC RAILWAY JOURNAL* for April 29, page 840. Under the terms of the agreement, the company will place in service double-truck cars on the Billings Park line as soon as the viaduct has been strengthened to permit the operation of this line. The company will also construct a line from Tower Avenue to the dock front on the Bay of Superior, to be completed by Dec. 1, 1917. The Tower Avenue and Belknap Street lines will be connected to serve what is known as the Normal School district. The latter line must be completed before Nov. 1, 1919. Approximately \$200,000 will be required to construct the extensions.

Kansas City (Mo.) Railways.—Preliminary to the paving of Main Street from Twelfth to Nineteenth Streets with creosoted wood blocks, the Kansas City Railways will lay new track and bring same up to grade. A 20-in. solid concrete base, sawed-oak ties and 95-lb. T-rails with welded joints will be used. The company is now welding 25 miles of track in the city.

***Beaver Valley Electric Railway, Baker, Mont.**—This company proposes to build an electric railway from Baker to Ekalaka, Mont., via Webster, 50 miles. The final location has been made for 25 miles of the line and the right-of-way has been secured. It is estimated that from 10,000 to 15,000 cu. yd. of material will be handled per mile. The contract for the grading work will be awarded by Aug. 1. The company will also construct a 150-ft. trestle.

Brooklyn (N. Y.) Rapid Transit Company.—Operation was begun by the New York Consolidated Railroad on the West End elevated line on June 24. Regular service will be from Chambers Street, Manhattan, as far as Sixty-second Street and New Utrecht Avenue, Brooklyn, and a shuttle service will be operated on the west-bound track from Sixty-second Street to Eighteenth Avenue.

New York Municipal Railway Corporation, Brooklyn, N. Y.—The Public Service Commission for the First District of New York has rejected all bids received on June 5 for the supply of about 52,000 tons of structural steel, for use in the construction of various portions of the dual system of rapid transit. The commission in rejecting the bids took cognizance of the fact that the steel market is falling and that the prices of steel will almost certainly be lower in the future. The commission has approved the awarding by the New York Municipal Railway Corporation of the contract for track laying and electrical equipment on the Jamaica extension of the Broadway elevated line in Brooklyn from Crescent Street to Cliffside Avenue to Lewis H. Woods, New York City. Bids were taken on four types of construction, Mr. Woods' ranging from \$136,947 to \$149,829.

Interborough Rapid Transit Company, New York, N. Y.—Bids were opened on June 26 by the Public Service Commission for the First District of New York for the construction of the 180th Street yard of Route No. 18, a part of the White Plains Road elevated extension of the Lenox Avenue branch of the first subway, the lowest bidder being Thomas J. Buckley Construction Company, New York, at \$26,922.50.

Northern Ohio Traction & Light Company, Akron, Ohio.—This company has applied to the Public Utilities Commission of Ohio for authority to issue \$14,057,000 first lien refunding gold bonds, of which \$1,955,300 is for improvements. Among the improvements planned are the following: Double-tracking A. B. C. line to Falls and north end of Bedford; improvements from Bedford to Newburg; double-track line between Canton and Massillon; extension to Mahoning line in Canton; Massillon extension; extension on Wooster Avenue, Akron; double-track line between Blue Point and Springfield Lake, 3.83 miles; double-track from Akron terminal over iceway to gorge, 2¾ miles.

Bangor & Portland Traction Company, Bangor, Pa.—Plans are being made by this company for direct track connection with the Northampton Traction Company at Bangor, giving a through line from Easton to Portland, a distance of 26 miles.

Nashville-Gallatin Interurban Railway, Nashville, Tenn.—Plans are being considered for the organization of a company to succeed the Nashville-Gallatin Interurban Railway for the purpose of constructing an extension to Springfield. The new line will be 18.4 miles long, the total distance from Nashville via the present Nashville-Gallatin Interurban Railway and thence by the route surveyed for the extension to Springfield being about 27 miles. The line will pass through Goodlettsville, Baker, Ridgetop and Green Brier. All surveys for the extension have been completed and rights-of-way are now being obtained, and it is expected that within the next month or two actual construction work will be begun.

Dallas, Northwestern Traction Company, Dallas, Tex.—E. P. Turner, vice-president of the Dallas Northwestern Traction Company, states that the company has not abandoned its railway project, although the bond interests prefer that a line be built from Dallas to Slidell, through Denton and Krum instead of the Denton-Krum line. Engineers have completed surveys and negotiations now under way regarding financial arrangements are expected to be completed shortly. [Jan. 29, '16.]

Galveston (Tex.) Electric Company.—This company is reconstructing about 1½ miles of ballasted track.

Houston, Richmond & Western Traction Company, Houston, Tex.—It is reported that construction will be begun about July 15 on this company's proposed line between Houston and San Antonio. The first section will be built between Houston and Gonzales, C. C. Godman, Kansas City, president. [June 17, '16.]

Temple & Marlin Interurban Railway, Temple, Tex.—S. D. Hanna, chief engineer of the Marlin-Temple Interurban Promotion Company, reports that he will have all surveys and right-of-way plans completed within the next sixty days for this company's proposed line from Marlin to Temple. As soon as these surveys are finished, plans for the line will be submitted to Eastern financiers who have already tentatively agreed to finance the project. [April 29, '16.]

SHOPS AND BUILDINGS

Massachusetts, Northeastern Street Railway, Haverhill, Mass.—This company has awarded a contract to E. A. Peabody & Son, Lawrence, for the construction of a carhouse at Merrimac to replace the one recently destroyed by fire. The building will be 90 ft. x 90 ft., and will be of brick and steel construction, with reinforced concrete floors and granite and cast stone trimmings.

Kansas City (Mo.) Railways.—The interurban railways entering Kansas City and the board of control of the Kansas City Railways have agreed upon a site for a terminal freight depot. Plans are now being perfected for the organization of the Kansas City Transfer & Warehouse Terminal Company, which will ask a franchise from the city for the operation of the terminal. The site selected is on Wyandotte Street between Third and Fourth Streets. Interurban freight cars will run over Kansas City Railways' tracks only to reach the terminal, and the Kansas City Railways will build and maintain the tracks for this purpose. The Kansas City, Clay County & St. Joseph Railway probably will abandon its present freight depot, which it has outgrown. The Kansas City Western Railway now uses the Strang line freight depot at Third and Grand Streets, which will be abandoned.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has authorized the advertising for bids, to be opened on July 14, for the construction of station finish for the Grand Central Station of the Queensboro subway. This work is to include the lengthening of the island platform of the present station of the Queensboro subway in Forty-second Street, between Lexington and Third Avenues. This platform is to be extended westerly for about 500 ft., and connecting with this extension there will be an underground passageway to the present Grand Central station of the first subway.

Beaumont (Tex.) Traction Company.—A contract has been awarded to H. Weber for the construction of an addition to the paint shop of the Beaumont Traction Company at the Irving Street carhouse. It is estimated that the addition will cost about \$1,800.

POWER HOUSES AND SUBSTATIONS

United Railways & Electric Company, Baltimore, Md.—A report from this company states that plans are being made to construct an additional substation to be located adjacent to its Electric Park carhouse to be known as the Belvedere Avenue substation. The company plans to install two or three 1500-kw. rotary converters with necessary transformers, switchboards and auxiliary apparatus.

Columbus Railway, Light & Power Company, Columbus, Miss.—It is reported that this company plans to purchase a 500-kw. generator.

Helena Light & Railway Company, Helena, Mont.—It is reported that this company plans to extend its transmission lines to Lenox.

Columbia Railway, Gas & Electric Company, Columbia, S. C.—This company is contemplating extensions to its transmission system.

Manufactures and Supplies

RETURN OF GOOD BUSINESS

Comparison of Rolling Stock Purchases for First Six Months of 1915 and 1916 Shows Satisfactory Increase

A review of the rolling stock columns of the **ELECTRIC RAILWAY JOURNAL** for the first six months of 1916 indicates that the electric railway industry, so far as rolling stock is concerned, is resuming its activity of the years prior to the general business depression of 1914 and 1915. This undoubtedly is due in part to the lifting of the retrenchment policy which has been pursued during the past two years but also to the increased traffic caused by better industrial conditions.

A comparison of the number of cars ordered in the United States and Canada during this period in 1915 and 1916 shows that 951 more cars have been ordered this year than last. This is a gain of more than 74 per cent over the 1273 cars which were ordered during the first six months of 1915. It is interesting to note from the following table that while the Eastern and Middle West States predominate in the number of cars ordered the percentage of increase in rolling stock purchased is distributed pretty evenly throughout the various sections of the country.

	First Six Months 1915	First Six Months 1916	Increase
Eastern States	730	1,257	527
Middle West States.....	462	805	343
Western States	22	49	27
Southern States	41	88	47
Canada	18	25	7
Total	1,273	2,224	951

The largest car orders placed this year to date are as follows: Bay State Street Railway, Boston, Mass., 200 cars; New York Municipal Railway, 200 subway cars; Public Service Railway, Newark, N. J., 197 cars, 177 of which are being built in its own shops and twenty of which have been ordered from an outside car builder; Cincinnati (Ohio) Traction Company, 100 cars; Connecticut Company, New Haven, Conn., 100 cars; Toledo Railways & Light Company, Toledo, Ohio, 100 cars; Kansas City (Mo.) Railways, seventy-five cars; New York (N. Y.) Railways, seventy storage-battery cars; Boston (Mass.) Elevated Railway, fifty-two articulated center-section bodies and fifty trail-car bodies; New York State Railways, Rochester, N. Y., fifty cars; Rhode Island Company, Providence, R. I., fifty cars; Detroit (Mich.) United Railway, fifty trail cars.

The industry naturally welcomes this return of good business conditions, which simply for rolling stock and its equipment, means the expenditure of \$4,755,000 more than was spent during the first six months of 1915. This figure is based on the conservative estimate of \$5,000 per car.

ROLLING STOCK

Tazewell (Va.) Street Railway is reported to have ordered one car from The J. G. Brill Company.

Willamette Valley Southern Railway, Oregon City, Ore., is reported to be in the market for additional equipment.

Columbus Railway, Light & Power Company, Columbus, Miss., is reported to be in the market for three double-truck cars.

Harrisburg (Pa.) Railways, noted in the **ELECTRIC RAILWAY JOURNAL** of March 11 as expecting to order five double-truck passenger cars, has purchased this equipment from The J. G. Brill Company.

New York Central Railroad, New York, N. Y., noted in the **ELECTRIC RAILWAY JOURNAL** of June 10 as expecting to purchase twelve 70-ft. cars, to seat ninety persons, has ordered this equipment from the Standard Steel Car Company.

TRADE NOTES

Ohio Brass Company, Mansfield, Ohio, has received a large order for Cleveland type splicers from the Connecticut Company, New Haven, Conn.

Cornell S. Hawley, president of the Laconia Car Company, has been elected president of the Consolidated Car Heating Company, Albany, N. Y., succeeding F. W. Kelley. Mr. Hawley will retain the presidency of the Laconia Car Company.

Heywood Brothers & Wakefield Company, Wakefield, Mass., reports the receipt of orders for seats for six interurban cars of the Schenectady (N. Y.) Railway; fifteen cars of the Buffalo & Lake Erie Traction Company; 105 cars of the Connecticut Company, and 200 cars of the Bay State Street Railway.

Roller-Smith Company, New York, N. Y., announces that it has recently established a St. Louis agency in the person of George W. Pieksen, who is located in the Railway Exchange Building, St. Louis, Mo. Mr. Pieksen will handle Roller-Smith products in St. Louis and in parts of the States of Missouri and Illinois.

Lord Manufacturing Company, New York, N. Y., reports the receipt of the following orders for screenless air cleaners: Bay State Street Railway, Boston, Mass., twelve; Middlesex & Boston Street Railway, Newtonville, Mass., eight; Westinghouse Traction Brake Company, sixteen, for the cars being built for the Binghamton (N. Y.) Railway. This company has also received an order from the Cape Electric Tramways, Capetown, South Africa, for twenty-four ratchet handles.

Ohio Brass Company, Mansfield, Ohio, effective July 1, will act as general sales agent in the United States for the entire line of Crouse-Hinds Imperial headlights for railway and mine use. The Imperial line enables them to furnish the headlight best suited to any condition as it contains a complete assortment of luminous arc, carbon arc and incandescent headlights. The Ohio Brass Company has made extensive preparation for taking over this line, its entire sales force and others having spent three days at the Crouse-Hinds plant in Syracuse, and will be in position to offer its customers the same service on headlights that has been given with the sale of its other materials.

Railway Improvement Company, New York, N. Y., reports the receipt of an order from the Kansas City (Mo.) Railways for 3000 No. 1A sanitary straps for use on present equipment, and an order for 1125 straps for the seventy-five cars now being built for this company by the St. Louis Car Company, Rico anti-climbers have been ordered for the 100 cars being built by the G. C. Kuhlman Car Company for the Toledo Railways & Light Company, the 200 cars being built by the Laconia Car Company for the Bay State Street Railway, and the 100 cars being built for the Connecticut Company. This last company, which operates 676 miles of line in New Haven, Hartford, Bridgeport and other cities and has 1826 motor and about fifty other cars, is gradually equipping its old cars with anti-climbers.

Rail Joint Company, New York, N. Y., announces that the Bonzano Rail Joint Company, as well as the Q. & C. Company, by advice of their counsel after investigation, have recognized the utility and validity of the Thomson & Thomson rail joint patents owned by the Rail Joint Company and have taken a license thereunder in order to utilize the Thomson & Thomson novel system of metal distribution, for head reinforcements, in connection with their Bonzano types of splice bars. Accordingly notice is given by the Rail Joint Company that the aforesaid companies are authorized under the Thomson & Thomson patents in the manufacture and sale of the Bonzano type of splice bars having the Thomson & Thomson system of metal distribution for head reinforcement.

ADVERTISING LITERATURE

British Thomson-Houston Company, Ltd., Rugby, England, has issued an eighty-eight-page pamphlet on steam turbines and generators. It contains an explanation, in simple language, of the principles of operation of the Curtis turbine and is well illustrated with diagrams and pictures of detail parts and assembled machines. Electric generators, both alternators and d.c. machines, are also described, and ventilating systems and air filters receive attention. Technical data are included in the form of curves and tables and as a whole the publication forms a convenient and readable treatise on the subject covered by its title.