

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 57

New York, Saturday, March 26, 1921

Number 13

New York Association Enthuses Over Trolley Freight Business Prospects

THE quarterly meeting of the New York Electric Railway Association, held in New York City on March 25, was considered by those in attendance to have been one of the most successful conferences held by the association in recent years. The program was short, it was prepared on short notice and brevity was the feature of the papers and contributions to the discussions. The amount of information brought out, however, was large, and it all related directly to the questions under discussion, *i. e.*, valuations, taxes, safety cars and freight and express business.

Possibly that part of the discussion which was of the widest application related to the merchandising methods used in the selling of freight and express service. The testimony was unanimous in showing the desirability of this service when its quality is good and its virtues are duly advertised. The discussion further showed that time will favor greatly the development of this business, because the operators of motor trucks are now finding out that it is unprofitable to compete with the rail lines over very long distances. The steam railroads will likewise soon reach the same conclusion with respect to extremely short distances. Electric railway service will therefore predominate between the limits of radius of operation which are set by economic considerations. The delay in settling down to an equitable division of the field has been due simply to the failure of both the truck owners and the steam railroads to realize the true economics of the freight haulage business, as well as to the partial failure of the electric railways in the past to go after their legitimate share of the business with the conviction and vim that are necessary to the greatest success.

Swapping Experiences Regarding Equipment Maintenance

IN ALL classes of work there is much satisfaction and considerable value to be obtained through discussion with others intimately connected with the same line of work. For this purpose the movement to form associations of master mechanics and equipment engineers in sections which do not extend over too great an area is very commendable. A noteworthy example of such an organization which has been in operation since March, 1918, is that of the Association of Electric Railway Men with members located in a radius of about 150 miles from Pittsburgh. The territory covered by this association extends north to Cleveland, Ohio, east to Johnstown, Pa., south to Clarksburg, W. Va., and west to Columbus, Ohio. Much benefit has been obtained from the round-table discussions which have taken place at this association's meetings and the railway men have been brought closer together by the exchange of ideas, thus tending toward the betterment of operation and the reduction of equipment maintenance costs in general.

Among the men who benefit most by affiliation with such an organization as this are those who have not been able to get to the national conventions, due to the expense involved and to the time necessary for making the trip where properties are located at a considerable distance from the place where the conventions are held. By the arranging of local associations in districts of not too great an area, this objection is overcome. It is understood that at the present time the forming of associations is contemplated or they are in the process of being formed in the South near Louisville, Ky., and in central New York. This movement should spread and it can do so without in any way detracting from the work of the Engineering Association, but rather the reverse. Representatives of the various standing committees can obtain a large fund of information and many valuable ideas from the experiences of the men actually doing the work, and there is nothing like a round-table discussion of a few intimate associates to bring out the good and bad points of equipment and to devise means which will satisfactorily overcome the troubles.

Three-Wire System for Electrolysis Mitigation in Winnipeg

THE Winnipeg Electric Railway is making what is probably to date the largest single contribution of experimental information on the use of the three-wire system in controlling electric railway return current. After careful investigation the railway adopted this means as the most practicable one for meeting the rather rigid specifications laid down by the city fathers. The railway's complete scheme involves some changes in the substation layout and the distribution system, but the three-wire arrangement is mainly depended upon to reduce potentials and potential gradients in the track to conform to the specifications prescribed by the city.

In order to prepare itself to meet the municipal specifications the railway company nearly three years ago engaged a railway man of long experience, W. N. Smith, as resident consulting engineer, to make an exhaustive study of the whole proposition. The result was a firm conviction on his part that the three-wire system would "fill the bill." As soon as this conclusion was reached, plans were made to apply it, and much interesting research work was done. The story of the progress made to date is given by Mr. Smith in this issue of the paper. The publication this week is timely because on April 1 the city expects the problem to have been solved and will presumably proceed to check up the work done by the railway company. From the data given in the present article it would appear that the test will be met in a satisfactory manner.

The three-wire system has been used from time to time on a larger or a smaller scale, the most ambitious undertaking on direct-current railways being that of the Pacific Electric Railway. In an article in the issue of this paper for Feb. 26, 1916, S. H. Anderson, electrical

superintendent of the Pacific Electric, gave the results of a year's experience with the plan on 125 miles of track. He made this significant statement: "There is nothing that can be accomplished in the matter of electrolysis mitigation by the use of an insulated negative feeder system which cannot also be accomplished by a three-wire system of distribution." In an article in the March 16, 1918, issue, Charles R. Harte, construction engineer the Connecticut Company, said: "As a means of reducing high potential gradients the change to the three-wire system is much less costly than a new substation or additional insulated negative feeder returns. There is, however, as yet not enough evidence available to say how much of the benefit is offset by the operating complications." The experience in Winnipeg will be of great value to the industry in verifying Mr. Johnson's conclusions, based on experience, and in supplying the lack mentioned by Mr. Harte.

Efficiency and Courtesy Will Strengthen Employees' Position

"THE day of sloppy work, violations of rules and insolence to public and employers is past." This is quoted from an editorial in an official publication of organized labor and it shows that at least some of the union workmen are thinking seriously of the future. Workmen are reminded in the editorial that the war is over, that the day of unwarranted strikes is gone, that immigration and lessened production have turned the advantage to the employers' side. In other words, a plentiful supply of labor has put an end to official leniency and tolerance of the past few years. Men are to be hired more carefully and held to a strict accounting for observance of rules.

Strikes are no cure for unemployment. The cool-headed trade union officials and representatives of Great Britain realized this a few weeks ago when they rejected a proposal for a general strike. The steam railroads are facing a situation of this kind, and the great packing house interests have been defied by the unions in their plans to go back to pre-war working conditions. A few electric railway companies have already reduced wages of trainmen and others have announced their intention to do likewise. The coming months are likely to bring a labor crisis on some of the larger properties.

Employees everywhere should ponder well over the circumstances before they take radical action. A "lost" strike may be the undoing of a union, as it was in Kansas City and several other notable instances. It will at least mean sacrifice of wages for an indefinite period, and it is well to consider that a lowered wage is better than none at all. Similarly it is better to forego some working conditions than to lose a job. We know of one company where concessions to the men in the form of shorter working hours and additional bonus time made it necessary to add several thousand trainmen to the force in order to keep the same number of cars in service. This, of course, added materially to the cost of transportation.

Wages were advanced throughout the country during the past few years because cost of living increased and because in some cases platform men were not to be had except by tempting offers. It was the old situation of supply and demand getting closer together. Now conditions have changed. All reports agree that cost of living is on the downward path. It is to be expected that wages also will have to go down.

The public soon will be looking for lower carfares. Its hopes will be realized only if costs of operation are reduced. Employees will not be making a popular move if they refuse to recognize the new status of affairs. Meanwhile they may strengthen their position by efficient and courteous service.

Some Exact Knowledge of Automatic Substation Operation

THE industry is greatly indebted to Charles H. Jones and the Chicago, North Shore & Milwaukee Railroad for the study and record of automatic substation operation which appear elsewhere in this issue. There has been an accumulating faith in the reliability of the automatic control, but it has been based on the absence of trouble without full knowledge of the service which the control was called upon to handle. Mr. Jones' scheme of checking up on the automatic stations has developed two things: a startling revelation of the large number of complete operations performed, and the remarkably low number of failures per given number of operations. For the five stations on which data were collected, 100,608 complete operations were accompanied by only 119 failures, or 1.18 failures per thousand operations, including a station where a defective brush-lifting device caused an abnormally high number of failures. Omitting this station, which involved only 7 per cent of the total number of operations covered by the study, although 40 per cent of the failures occurred there, the number of failures per thousand operations for the remaining four substations was 0.78. This gives a clear exposition of the ruggedness and reliability of the automatic equipment, for it is probable that the average operator in a manually controlled station will make more than one failure per thousand operations in starting up a station, synchronizing and throwing in on the line.

Chief among the advantages apparent from Mr. Jones' study is that to be derived from the interspacing of substations on existing railways, a plan made economically possible by the absence of need for an operator. Nearly all interurban roads are now laid out on a plan of grouping two or more rotaries in each substation. If some of these machines were installed in new stations located at points midway between existing stations, considerable improvement in the trolley voltage, and hence the service, and marked reduction in power losses would result. The possibilities here are so important as to deserve the immediate attention of nearly every railway system. This is substantially the procedure which was followed on the North Shore line, for of the six machines automatically controlled, four are old ones removed from existing stations.

The fact that the individual old converter will in many instances be of capacity too small to handle by itself the total load of a train starting in its immediate vicinity is not a controlling factor, for the use of the load-limiting resistance enables the machine to remain on the line and carry only a normal overload. This ability to carry a greater load per unit is demonstrated by the experience on the North Shore line, where an increase in converter type of 52.6 per cent has made it possible to handle approximately one hundred per cent increase in total power produced. This was made possible largely through the interspacing of stations, which in turn was made feasible by the automatic. Detail estimates which have been made of the savings available through distributing the existing machines along

the line in accordance with present day railway power engineering show that the total cost of the change can be written off in from one and a half to two years.

Aside from bringing out prominently the considerations already mentioned, Mr. Jones' contribution to the industry satisfies in a way the curiosity felt by most power men as to what is going on between inspections in the attendantless substation. There is the further gratifying finding that the wear on contacts and other parts of the control equipment is extremely small, indicating long life and low maintenance cost.

Wage Reductions and Fares

NOW that many of the electric railways, like other industries, are contemplating the reduction of wage scales as agreements expire, it is pertinent to consider what the relations are between wage reductions and fare reductions. Undoubtedly many people are under the impression that as so much of the cost of the carfare is labor, important reductions in electric railway fares may be expected contemporaneously with lower wages. But those responsible for the operation of the traction companies should be on their guard against leading the public to expect too much in the way of immediately lower fares.

In the first place it should be remembered that increases in carfares lagged considerably behind the original wage increases, and that even the 10-cent fares that now exist in some places are only double the old rates, while street railway wages are generally much more than double the rates of ten years ago.

Secondly, there seems to be little likelihood that the approaching reductions can bring wages back to anything like the old rates. It is only a few years since many companies paid rates in the neighborhood of 20 cents an hour. Does any one look for a return to these conditions in the near future?

Suppose a company puts into effect a wage scale approximately 20 per cent lower than the existing one. That would represent, say, a drop from 60 cents per hour to 48 cents. A sudden change of this amount would require a very great change in the family budget of the workman. Yet even were this done, how much fare reduction might be expected? Roughly speaking, payrolls of the average traction company will average about 50 per cent of the total revenue. To reduce the payroll 20 per cent might then permit of an equivalent reduction in revenue of 10 per cent. This would mean that a 10-cent fare might be reduced to 9 cents. A 7-cent fare reduced 10 per cent would be 6.3 cents. Some reductions may also be expected in the costs of materials, but interest rates have shown no tendency to come down, and where a company has had to refund during the last few years any considerable issues, the increase in interest rates is a serious one.

It is difficult to see where wage reductions of much more than 20 per cent can be looked for in the imme-

diately future and the companies could well use any saving due to lower wage scales and lower costs of materials to build up a reasonable surplus fund, similar to the "barometer" funds of some of the service-at-cost plans. They could then better afford to experiment with reduced fares when entrenched in a stronger financial position than most of them now find themselves.

A. R. E. A. Convention Reports Are Up to Usual Good Form

THE sterling character of the committee reports presented to the American Railway Engineering Association at the Chicago convention held last week are apparent to those who have taken the trouble to read them. The association is functioning true to form, and the committee work continues to be of a high order of excellence. In general the work which the association is doing is of untold value to the railway engineering profession and a reading of its committee reports cannot do otherwise than to inspire railroad men to greater efforts.

There is one feature of the association work which greatly enhances its value to the members. This is the publication of its committee reports in bulletin form so that most of them are in hand long before the convention; the members are thus given time to study the reports and prepare for discussion at the convention. It may not be out of place to suggest that similar publication of reports by the American Electric Railway Engineering Association would be worthy of consideration by the executive committee of the latter association.

The railway engineers continue to find difficulty in inducing a more general adoption of their standards and recommendations by the individual railroads, and a concerted effort is being made with the view of securing a wider use. The lack of interest displayed in the standards is in parallel with that found in the electric railway engineering field, where the individual members have also been loath to adopt the standards and recommendations promoted by the American Electric Railway Engineering Association. It is evident that both associations must continue their efforts toward "selling" their standards.

An abstract of some of the more important details of the committee reports will be given next week, but it will not be possible, in the space allowed, to go deeply into the numerous phases of railroad engineering which are covered by the twenty-three

standing committees whose reports cover practically the entire range of railroad construction, operation and maintenance. The magnitude of the work accomplished by the association in the twenty-odd years of its existence is indicated by the fact that the 1921 edition of the Manual, which has not been completely revised since 1915, will contain approximately 1,000 pages. This will be a veritable encyclopedia of railroad engineering.

Quotation from the Federal Electric Railways Commission Report

No. 13

THE electric railway problems admit of a satisfactory solution once the elements that compose them are made known and the process of ordinary economic and business common sense is applied. The duty of both the public authorities and those who control the electric railway enterprises of the country is plainly indicated. The time has come for a permanent and satisfactory settlement of the traction question. The interests of both the public and the companies lie so exactly parallel in almost every respect that there ought not to be any serious difficulty in arriving at a solution if both parties approach the subject in a proper spirit.

Electrolysis Mitigation in Winnipeg

Three-Wire System Has Been Applied to Bring Ground Return Conditions of the Winnipeg Electric Railway Into Conformity with "Electrolysis Act" Passed by the Legislature of the Province of Manitoba — Engineer Responsible for the Work Tells What Has Been Done to Date and Why

By W. NELSON SMITH

Consulting Electrical Engineer Winnipeg (Man.) Electric Railway

FOR some years the corrosion of cast-iron water mains in Winnipeg has been a subject of controversy between the city administration and the Winnipeg Electric Railway, as potential differences existed in the railway tracks which permitted a leakage of stray current to underground structures. In 1914, at the request of the Manitoba Public Utilities Commission, which had been established two years previously, the late Prof. Albert Ganz of Hoboken, N. J., made a survey of conditions and reported on them in 1915. This report was summarized in a number of recommendations, establishing limits of track potential differences, calling for permanent means of observing them and favoring an additional substation and insulated negative return feeders on the old two-wire system. These, up to 1915, were the only methods considered practical for mitigating electrolysis conditions. The three-wire system had not then won the general recognition that it did a year or two later.

In view of the great capital expenditure and the extra loss in power and car speed incident to the two-wire return-feeder system Professor Ganz's report not only left the details of feeder distribution to the railway but expressed his recommendations so broadly as to make the use of the three-wire system possible.

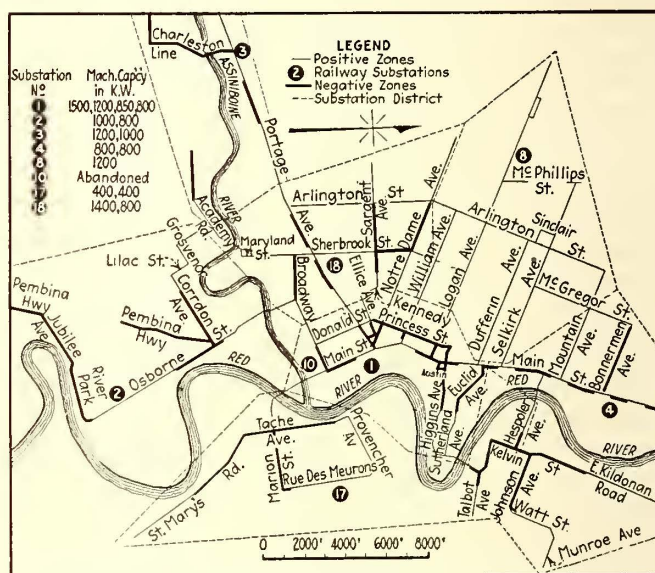
PROVINCE PASSES "ELECTROLYSIS ACT"

In 1917 the company installed a couple of negative boosters with insulated track feeders at two of its substations. In the spring of 1918, as part of a contract between the railway and the city, which involved the abolition of jitneys by the city and the undertaking of various improvements by the company, the company agreed to follow the recommendations of Professor Ganz, as embodied in the "electrolysis act," which in the meantime had been passed by the Manitoba Legislature, making into law most of the Ganz recommendations with some modifications and omissions. The provisions of the act respecting electrical drainage of underground cables placed that matter under the jurisdiction of the commission. Drainage of gas and water pipes is forbidden by the act. This was the situation when the writer, in June, 1918, undertook the task of reducing the track potentials and gradients to within the prescribed legal limit.

An engineering study of the situation showed clearly that, due to the heavy cars in use and light weight of rails employed, the same amount of copper would go very much farther if used on the three-wire system of distribution than on the two-wire system of insulated negative return feeders. The latter, up to the time that Professor Ganz made his examination and report, had been regarded as the only available practical method of reducing track potentials and stray currents. The process of final adjustment in equalizing track potentials

is also carried out more conveniently by the three-wire than by the two-wire system. In view of the financial situation at the time, these advantages of the three-wire system were too important to be disregarded, even though it involved a departure from previously established standard ideas and methods.

The three-wire system was first worked out on a large practical scale in this country in the Los Angeles district in California in 1915 (after Professor Ganz



SKELETON MAP OF WINNIPEG, SHOWING ELECTRIC RAILWAY LINES, RAILWAY SUBSTATIONS AND THREE-WIRE ZONES

made his report). It was so successful in reducing track potentials and gradients and in stopping the electrolysis troubles resulting from them that the United States Bureau of Standards had paid special attention to its application, not hesitating to recommend its adoption in other places, and had formulated the theory of applying the three-wire system in practice along lines that would be of greatest service in automatically protecting underground cables as well as water pipes.

STATUS OF THE THREE-WIRE SYSTEM IN 1918

The "state of the art" in 1918 was very carefully investigated by the writer, who found that the three-wire system was then in successful operation in Brisbane, Australia; in the vicinity of Los Angeles, Cal.; in Omaha, Neb., and in Milwaukee, Wis., with installations projected for immediate use at Springfield, Mass., and Wilmington, Del., and recommended for New Orleans, La.

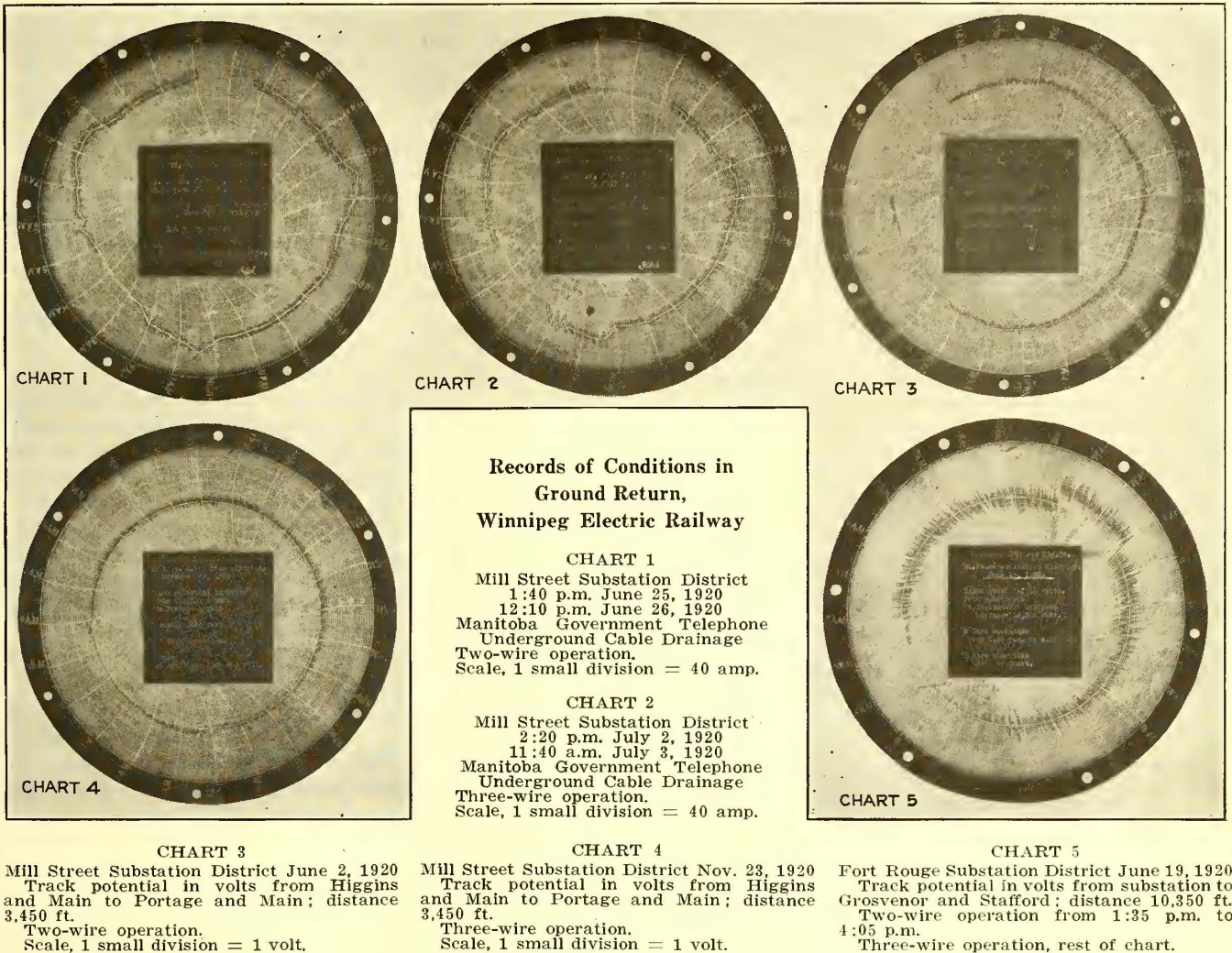
From the accumulated practical experience from various sources of first-hand engineering information, it appeared that the conditions of trolley distribution in

Winnipeg lent themselves readily to changing the system over from two-wire to three-wire operation. Besides the heavy cars in use and the light rails, the substation motor-generator units are of sizes available for balancing in three-wire operation with a minimum of rearrangement, and all permanent substations but one had at least two machines. The feeder distribution is nearly all overhead. The trolley lines were originally subdivided into very few sections, and this fact had given rise to more or less inconvenience at times of accidental breaks in the trolley system so that the

ing. Line failures are rare, and in extreme cases of emergency everything can be paralleled on the two-wire system, if necessary.

The general method adopted for three-wire operation is the so-called "sectional method," in which the alternate sections of any double-track or single-track line are of opposite polarity, progressively along the line.

The general method of sectioning followed is to set off three zones from each substation to the extremity of its feeding district, and to reverse the middle zone of the three. A number of variations have been made



operating staff rather welcomed the idea of sectioning the lines.

The paramount consideration was the reduction of track potentials and gradients to within the limits required by law, so it was regarded as a matter of minor importance whether the cars of certain lines were kept continuously on the same feeder and trolley sections or not. It is sometimes thought that it is unwise to take a chance of stalling the cars of some particular line at one part of their run, by reason of some electrical failure that affects one section but not the others, but as the Winnipeg car lines are not susceptible to a great degree of segregation in the center of the city this feature did not require special treatment, and after more than a year's operation in one district and some months' operation in two other districts, one of which is the central district of the city, there has developed no reason to revise the general arrangement of section-

ing from this general standard to meet particular cases, but this general principle was the one adopted, it having been established by E. R. Shepard of the Bureau of Standards that this combination offers the lowest reduction of track potential combined with the tendency for stray currents in underground cables to flow continuously toward the substation, as compared with any other system of sectioning.

The Winnipeg Electric Railway's original system of substations and railway generating units, as arranged prior to 1918, was as follows:

No. 1	Mill street station	1—1,500-kw.	1—1,200 kw.	3—800 kw. M.G.sets
2	Fort Rouge substation	1—1,000-kw.		
3	St. James substation	1—1,200-kw.	1—1,000-kw.	
4	North End substation	2— 800-kw.		
8	Logan Ave. substation	1—1,200-kw.		
10	Assiniboine substation	1—1,400-kw.		
	Total capacity		12,500-kw.	

It had been realized that any scheme for the mitigation of electrolysis would probably necessitate the utilization of every pound of feeder copper that could be made available from the entire railway and lighting system of the company. It had, therefore, been decided before the writer was retained that a new substation should be created in St. Boniface, east of the Red River, at a point contiguous to the right-of-way of the 60,000-volt transmission line over which power is transmitted from the hydro-electric power plant to the receiving station at Mill Street, for by so doing a heavy alternating current feeder of six 500,000-circ.mil cables, about 2 miles in length, serving a large power customer, could be nearly all salvaged for trolley feeder purposes, and certain important power customers in St. Boniface would be given very much better service. The first thing to do was to design and build this new substation. This was fitted up throughout with electrical equipment taken out of various other substations of the railway, where it was not working at full capacity. The transformer equipment comprised three 1,000 and three 800-kw., 60,000/2,200-volt transformers, much of the 2,200-volt power being used for light and power customers in the vicinity.

To provide the trolley current for the lines on the east side of the Red River which this station was to feed, a motor-generator unit was created by reconstructing anew, from three disused engine-type generators removed from their engines, a three-unit railway motor-generator. The component machines consist of an 800-kw. 2,200-volt alternator used as the motor and two 400-kw. railway generators. The alternator originally ran at 90 r.p.m. and the railway machines at 100 r.p.m., but it was found upon testing the latter that they would operate satisfactorily at 90 r.p.m., so this combination was decided upon, and the machine was designed, erected and operated as a three-unit, three-wire machine. Thus three-wire trolley distribution was made possible in most of the district east of the Red River from the new St. Boniface substation. The load within easy reach of this substation was well within the capacity of this machine.

RESULTS IN THREE-WIRE OPERATION

The first demonstration of three-wire operation, however, was made in the district fed by the Fort Rouge substation. One of the 800-kw. machines was taken out of Mill Street substation and moved to Fort Rouge. The relatively small amount of change in the Fort Rouge switchboard was made during the winter of 1918-19; some 6 or 7 miles of feeder copper were transplanted into the Fort Rouge district, and the feeder system there rearranged, and on March 30, 1919, three-wire operation began in this district. It was successful from the start, although refined results were somewhat interfered with by the fact that the track potentials on the lines north of the Assiniboine River fed from stations No. 1 and No. 10 were exactly as they had been previously, and considerable return current going back to No. 10 station near Main Street from the district extending a mile or so to the west of it was shunted through the railway tracks across the bridges over the Assiniboine river. This changed the track potentials in the tracks in the Fort Rouge district from what they would have been had this shunting of track current been preventable.

Tests made in May, 1919, showed that the reduction of track potentials taken between the substation and

the principal outlying points in the Fort Rouge district was from an average of 11 volts under two-wire operation to an average of 3 volts under three-wire operation, a reduction of 73 per cent.

THREE-WIRE DISTRIBUTION EXTENDED

These results were considered sufficiently good to warrant the extension of three-wire operation to the remainder of the system. On Oct. 1, 1919, the three-unit railway motor-generator at the new St. Boniface substation, above described, was placed in three-wire operation. The results in the St. Boniface district showed a reduction of the potential from St. Mary's road at the south city limits to St. Boniface substation, from 10 volts under two-wire operation to 4 volts under three-wire operation, and the potential difference between the intersection at Tache and Marions Streets and the St. Boniface substation, around the loop, was reduced from 5 volts to 1 volt.

The Mill Street substation, which is the largest of any, had its switchboard changed over for three-wire operation during the first half of 1920, and on July 1 three-wire operation was begun in the central district of the city. Everything tested out perfectly the day before the change was to be made, and the system has worked with perfect smoothness under the most congested conditions of city traffic on the principal streets in the center of the city. In this district the initial reduction in cable drainage current was 62½ per cent. This will subsequently be further reduced, because the present zoning arrangement of this central district is such as to cover a considerably larger area than will be the case later, on account of the fact that the Sherbrooke substation is not yet completed, and the Mill Street substation now has to carry not only its own territory but also that which will be ultimately carried by Sherbrooke.

The above reduction of stray current is shown in the pair of drainage charts here reproduced.

The track potential reduction in the heavily loaded Mill Street district is shown in a second pair of charts, while a fifth chart shows the reduction at a point in the Fort Rouge district, with a lighter load at a much greater distance.

In October, 1919, the writer submitted the complete plan for changing over the entire system to three-wire operation. This is shown on the map on page 584.

Among Professor Ganz's original recommendations in his 1915 report it had been suggested that a new substation should be constructed near the intersection of Portage Avenue and Sherbrooke Street, which is the center of a fairly heavy load. The significance of this recommendation lies in the fact that it is 3½ miles from Mill Street substation No. 1 to the St. James substation No. 3, on the west city limits, and that the traffic on Portage Avenue is quite heavy, with an appreciable traffic also to be cared for on Sherbrooke Street and on Sargent and Notre Dame Avenues, the next adjacent lines on the north.

The Assiniboine substation No. 10, located on Main Street near the Assiniboine River Bridge, had originally been the site of the first steam power plant, and although the steam plant operation had been discontinued for a number of years, the building had still been continued as a source of electric railway distribution by installing a 1,400-kw. motor-generator in it. This condition meant that No. 1 and No. 10 substations together, they not being very far apart, fed a large

district for about a mile west of Main Street, and all the return current naturally had to flow back east toward Main Street, making a fairly heavy pitch or gradient of track potential all the way down Broadway, Portage Avenue, Sargent Avenue, and Notre Dame Avenue, from Sherbrooke Street to Main Street. The neutral point between Mill Street station and St. James substation was also near Sherbrooke Street. It was thus logical not only to transplant No. 10 substation to the west but also to select a new site for it in the vicinity of Portage and Sherbrooke Streets.

As the whole situation thus pointed to the importance of reducing the track potential between Sherbrooke Street and Main Street to the lowest possible amount, it was decided to transplant the Assiniboine Avenue 1,400-kw. machine to a new substation to be built in the above named locality and add an 800-kw. machine from Mill Street to it, in order to get three-wire operation in the new Sherbrooke district, replacing the latter machine at Mill Street by creating another reconstructed motor-generator out of two old engine-type generators, an 800-kw. alternator and an 850-kw. direct-current generator, still standing in the old Assiniboine steam plant. Three 833-kw. lowering transformers and a 22,000-volt cable from Mill Street supply the power.

This plan has been carried out accordingly, the substation building on Sherbrooke Street is now completed and the equipment is being installed in it. Two-wire operation, with the 800-kw. machine, has already been tried out from this station and has shown that the track potential along Portage Avenue from Sherbrooke Street to Portage and Main Streets, about 1 mile, can be reduced from about 12 volts to 2 volts, and that with three-wire operation the potential difference on this heavy line will be practically negligible.

The Logan Avenue substation has but one machine in it, and as there is no other motor-generator available to pair with it for enabling three-wire operation it was decided to extend the negative insulated return feeder system that had several years previously been installed there with a negative booster.

This station is to be fitted with a new arrangement of resistances in such a manner that the track in front of the station will be the point of lowest potential of the track system, which has not always been the case hitherto, due to faults in the original installation.

The three-wire system causes frequent reversals of stray current in underground cable sheaths in districts where the traffic is light. The scheme of cable drainage contemplates maintaining all present drainage connections into the substations. When circumstances require, it is proposed to use small negative boosters, or "suckers," of about 1-kw. capacity each with resistances in series, if needed, to assist in determining the inward direction of cable drainage current, subject to the approval of the Public Utilities Commission, which under the law has jurisdiction over the amount of drainage to be applied to all underground cables.

SPECIAL CONSIDERATIONS IN THREE-WIRE DISTRIBUTION

With the three-zone system of three-wire sectioning and only two machines in a substation, the positive machine is apt to be overloaded and the negative machine underloaded, when both are the same size or nearly so. It has been found necessary in several cases to vary the zoning arrangement to favor the substation machinery by dividing the load more evenly between

the two machines. Several outlying suburban lines reaching into distant districts have their polarity reversed, on account of the sparseness of parallel underground structures, but it is likely that positive and negative zones will have to be alternated frequently on light lines just within the outskirts of the city.

In the case of the North End substation, the two machines are of the same size, 800-kw. each, and the load in the district is already about as much as the two machines can carry. Consequently it has been necessary to cut the district up into more than three zones of opposite polarity in each direction, so as to have the aggregate negative load more nearly equal to the aggregate positive load. This has worked very successfully, and the cable drainage current predominates inward.

DETAILS OF THE SECTION INSULATORS

The method of sectioning the trolley wire consists simply of placing two standard section insulators in series, with the adjacent tips only a few inches apart. There have been no accidents whatever to the overhead construction from accidental short circuit, either between trolley wires or feeders of opposite polarity. The only accidental occurrences chargeable to the three-wire system have been an occasional short circuit caused by careless platform men placing both trolley poles of double-ended cars against the trolley wire on opposite sides of a 1,200-volt breaker when turning cars, which happened in a very few instances when the central district of the city was changed to three-wire operation during the past summer. As the two breakers in series make a rigid spot in the trolley wire that causes the trolleys to wear out the breaker by pounding, it is probable that a single breaker with 16 in. of insulation will be gradually substituted for each pair.

Permanent potential wires are installed from all outlying extremities to the substation in each district, connecting to a permanent recording track potential voltmeter in the substation, from which charts can be taken at any time, thus enabling a constant check on the resulting distribution of track potentials to be made.

About 38 miles of No. 10 insulated weatherproof wire are required.

The regulation regarding track potentials is as follows:

The maximum potential difference between any two points one thousand (1,000) feet or less apart on said rails or other metallic conductors will not exceed one (1) volt, and further, so that the potential difference between any two points more than one thousand (1,000) feet apart on said rails or other metallic conductors will not exceed seven (7) volts, such maximum voltage drop to be the mean value between the highest momentary peak and the average for the thirty minutes of maximum load, but such track voltage requirements shall apply only on a business day and not to abnormal operating conditions brought about by fires, storms or the movement of crowds on holidays.

The above method of computing the average track voltage result is not Professor Ganz's, but was borrowed from the unofficial standard method of interpreting the British Board of Trade regulations used in England. A little study will show that the legal average of a fluctuating voltage curve will be higher than the real average, in the proportion that the momentary peak exceeds the real average. Therefore, the actual average must be brought below 7 volts, if the legal average is not to exceed 7 volts. This very rigid restriction is being met in Winnipeg by the three-wire system in a very remarkable degree, even before the system is completed.

Completion of the system, hitherto delayed by the inability of manufacturers promptly to deliver even the simplest details of electrical equipment, is looked for within a few months, and after the final adjustments have been made a more comprehensive record of results which have actually been accomplished will be available.

SUBSTATION CHANGES

The changes in substation connections were very simple. Fortunately, many of the machine panels were already provided with double-throw main switches, on account of the earliest installation of motor-generators having been designed to operate interchangeably with the railway circuits and with a commercial 500-volt power circuit, which is still maintained by the company. This fact was particularly helpful in working out the changes in the Mill Street substation, which is the largest and most centrally located.

The principal task in arranging this switchboard consisted in the addition of a new negative busbar and the installation of a heavy single-pole circuit breaker, which can connect the positive and negative buses by being closed when two-wire operation is desired.

The breaker is maintained open for three-wire operation. This general principle of bus connection is followed in all stations to connect and disconnect the positive and negative buses for changing from two-wire to three-wire operation.

The original internal connections of the machines themselves are not altered and the relation between the field and armature connections of the generators is not changed when the polarity of the machine is reversed. Usually the same machine is always run on the same side of the system. The same feeders are also maintained permanently at the same polarity in order to establish fixed conditions of automatic cable drainage.

Interlocks are being devised which will automatically prevent mistakes by substation operators in throwing machine and busbar switches when changing polarity.

The schedule of substation equipment under the new arrangement will be shown in table below:

Mill street	1—1,500-kw.	1—1,200-kw.	1—850-kw.	1—800-kw.,	4,350 kw.
Fort Rouge	1—1,000-kw.	1— 800-kw.			1,800 kw.
St. James	1—1,200-kw.	1—1,000-kw.			2,200 kw.
North End	2— 800-kw.				1,600 kw.
Logan	1—1,200-kw.				1,200 kw.
St. Boniface	2— 400-kw.				800 kw.
Sherbrooke	1—1,400-kw.	1— 800-kw.			2,200 kw.
				Total	14,150 kw.

Another feature of this installation, which will be added to it during the next few months, is a system of feeder-tie switches to be mounted on poles at the boundaries of adjoining feeding districts and worked by control wires from the nearest substation, so that some of the positive feeders and some of the negative ones may be used to interconnect the substations and operate the whole system in parallel on either the three-wire or two-wire system. This is intended to safeguard continuity of service on the three-wire system as much as possible in case of failures of machines in the substations; to permit three-wire operation of the whole system throughout the entire twenty-four hours (it being customary to shut down all but the Mill Street substation from midnight till morning), and to permit change-over to two-wire operation quickly if required in extreme emergencies.

The foregoing feeder rearrangement has so far been carried out without the purchase of any quantity of new feeder cable. Enough cable will be salvaged to provide whatever may be deemed advisable to supplement the trolley wires on several of the heaviest routes, to prevent overloading of the trolley wires, especially should one of the trolley wires happen to pull apart, which sometimes happens during the extreme cold winter weather. The total amount of feeder cable in use in the trolley distribution system in the city of Winnipeg is about 75 miles, of which about 20 miles is being taken down and re-erected to feed the new arrangement of positive and negative sections and to provide the above-mentioned system of tie feeders.

INVESTIGATION OF SELF-CORROSION

In all previous investigations and attempts at electrolysis mitigation in Winnipeg the peculiar chemical composition of the soil in and about the city had been ignored.

The deterioration and occasional complete destruction of underground structures, built of cement concrete, by the alkaline salts dissolved in the ground water has been so widespread in western Canada that the engineering profession has been compelled to recognize the risk run by all such structures and take steps to minimize it where possible. The general public is now aware of the continual jeopardy in which all buried concrete structures are placed, by virtue of being in soil containing a high content of soluble alkaline salts, which are mostly carbonates, sulphates and chlorides of magnesium, calcium and sodium, in combination.

The destruction of even the best concrete by these alkaline solutions in the soil led the writer to institute an investigation, with the aid of a professional chemist of high standing, to determine the effects of the contact of such solutions upon cast iron and lead, both with and without access of stray electric current.

The investigation is not yet complete, but enough work has been done in the laboratory and corroborated by examinations of buried pipes in areas where stray current does not exist to demonstrate that the customary attitude of blaming stray current from the railway for the widespread pipe corrosion in Winnipeg, under the existing soil conditions, is subject to considerable modification. The programme of the construction work necessary to achieve the reduced track potentials and gradients will not, however, be altered in any way by reason of this recently acquired knowledge of self-corrosion possibilities.

ORGANIZATION

The field work in the foregoing programme has been done by the construction force of the electrical department of the Winnipeg Electric Railway. The earlier part of the work of execution, comprising the design and construction of electrical details in Fort Rouge and the design of the electrical connections in St. Boniface substation, was begun by G. A. Mills, then electrical engineer, and brought to completion by Arthur Trott, electrical superintendent, who also had executive charge of designing and carrying out the details of all electrical switchboard changes at Mill Street, North End, St. Boniface and St. James stations and of all details of the new electrical equipment at the Sherbrooke substation.

The difficult task of changing over the railway switchboard at Mill Street substation from two-wire to three-

wire was also laid out and executed by Mr. Trott, with the assistance of K. C. Ferguson. Their work also included the mechanical and electrical assembly of the reconstructed motor-generators. The trolley and feeder rearrangement was executed by O. W. Boyle, superintendent of electrical distribution. The mapping of the circuits and working up the details for their rearrangement, together with the large amount of field testing required to prove out results, were done by H. G. Stewart. To the interest, foresight and loyal

co-operation shown by the entire organization is due the smoothness and the freedom from interruption of electrical operation during the transition period. The execution of field work not yet completed will be carried out by D. K. Lewis, recently appointed electrical engineer of the company.

The responsibility for the general conception, design and supervision of the entire scheme and for the engineering procedure throughout has been carried by the writer.

Illinois Utilities Hold Successful Joint Convention in Chicago

Papers and Discussion on Shop Personnel and Maintenance, Track Labor-Saving Devices and Automatic Substation Operation—Joint and Sectional Sessions Were Held Each Day, the Former Devoted to General and the Latter to Specialized Topics

FROM a railway standpoint, a very valuable and practical paper on automatic substation operation and the discussion that followed were outstanding features of a joint convention of the Illinois Electric Railways, Illinois Gas and Illinois State Electric Associations in Chicago on March 15 and 16. The joint meetings of the three associations were held during the forenoons, while separate simultaneous sessions were held each afternoon. At the opening session, on March 15, the joint meeting was addressed by W. M. Willett, president of the Gas Association, who referred to the significance of the joint convention. He said it demonstrated that the utility companies have recognized that the fundamental interests of these three utilities are one and the same. He considered this recognition in itself to be a great stride forward as it is only a short time since at least two of the organizations represented considered themselves competitors, and that the recognition of any virtue in one by the other would have been considered a sign of weakness. One of the happy results of the struggle for existence during the past few years has been the cementing together of these great lines of industry until today they are seeking co-operation. They are drawn together by a natural, logical and fundamental bond. The great work for the immediate future is to extend this period of co-operation and confidence to include the 7,000,000 customers served in the State.

In addition to the transaction of the business of the convention, the meeting was occupied for the remainder of the first morning by an address by John F. Gilchrist, vice-president Commonwealth Edison Company, Chicago, on the financing of public utility extensions through the sale of securities to the customers.

At the joint session on the second forenoon Charles H. Munroe and Martin J. Insull, presidents of the American Gas Association and National Electric Light Association respectively, addressed the meeting. Philip H. Gadsden, president of the American Electric Railway Association, was to have addressed the meeting, but was unable to be present.

Mr. Munroe spoke briefly on the work of the American Gas Association, with particular reference to the effort which had been made to bring about a basis of taxation that would remove the unfair advantage now

obtaining for municipal bonds sold to cover the cost of public utility plants. He pointed out that because of the exemption of municipal bonds from the income tax, a big differential in favor of the municipal bond over private corporation bonds, though issued for the same identical property, is set up. He said that people who are in the upper register of the income tax and are required to pay back to the Government 73 per cent of their income are forced to buy tax-exempt bonds. Because of this situation, the bonds of the privately owned utility company would have to yield 22 per cent in order to be equivalent to a 6 per cent municipal bond. The Gas Association endeavored to secure the co-operation of the two other major utility associations in obtaining exemption of privately owned utility bonds from the income tax until such time as a constitutional amendment could be passed which would place a tax on municipal bonds representing utility plants. However, there was some feeling on the part of the other associations that this was not just the right way to go about it and the matter was dropped, to the regret of Mr. Munroe. He said, however, that Carter Glass had devised a scheme which would accomplish indirectly what his association had been unable to do directly. It is impossible to tax municipal property except by a constitutional amendment, but it is possible to tax the income from the operation of such municipal utilities. This, if carried out, would probably serve to remove the advantage municipal bonds now have over the privately owned utility bonds.

Mr. Insull spoke at some length of the work of the N. E. L. A., its service, engineering and publicity departments, and also of the success which has followed the geographical section reorganization of the association. He emphasized the point that excellence of service on the part of the utilities is the best means of creating and preserving good public relations.

A paper was also presented by W. L. Abbott, chief operating engineer Commonwealth Edison Company, on the broad subject of "The Consumers' Stewardship of the Coal Deposits."

PROCEEDINGS OF ELECTRIC RAILWAY SECTION

At the electric railway section meeting on the afternoon of March 15 M. J. Feron, general superintendent

of transportation Chicago Elevated Railroads, read a paper which described the method of keeping a continuous traffic check on the elevated roads and North Shore Line. This paper appears in abstract elsewhere in this issue. In discussing Mr. Feron's paper, D. E. Parsons, general manager East St. Louis & Suburban Railway, East St. Louis, Mo., said that to an operating man in Illinois outside of Chicago Mr. Feron's paper was somewhat like a fairy story. He did not believe there is any property outside of Chicago requiring an organization for traffic survey alone. Most of the analyses are accomplished by observation of the number of passengers carried on the different divisions, either weekly or monthly, and in cases of unusual conditions, daily. He spoke of the difficult rush-hour problems in East St. Louis and said that while the regular and non-rush-hour schedules in East St. Louis are seldom changed, it is necessary to subject the rush-hour schedule to frequent and radical changes. Control of the service during the rush hour is nearly all done by observation through the supervisors in charge of the different divisions. The rush-hour service is augmented by trippers, which are regularly scheduled for a certain period of time each morning and afternoon, and extras, which do not run on any schedule but are under the supervision of the assistant superintendent of transportation. These extras are handled to the best advantage through agreement between the supervisor and the assistant superintendent as to how they will be operated on any particular day. Conferences are held about twice a week to determine the use of the extras.

In East St. Louis, where the different industries close at different hours, it is possible to use one car on as many as four routes during the evening rush hour, thereby getting the full benefit of each car and not allowing any layover of consequence at any particular point. The lines are generally of short haul and it is easy to handle the extra cars in this way.

About double the number of cars are required for rush-hour operation as are necessary for the non-rush-hour service. One route requires nine cars for the non-rush-hour schedule and twenty-two cars in the evening rush hour. On the stockyards division four cars are run during the non-rush-hour, while in 1920 it required twenty-six cars to give the rush-hour service.

Mr. Parsons also described the operation of the company in a community of about 25,000 people, in which the city cars serve as feeders to the interurban line which runs to St. Louis. Some years ago these cars were operated like taxicabs for the benefit of the residential patrons. For example, the motorman would ring his bell on the outbound trip to notify the patrons that he would be back in a little while, so they could hurry with their breakfasts, and the motorman would then stop in front of each patron's residence on the way back. This personal service had to be stopped, as there were cases where the motorman and a patron had some little difference and the former would refuse to stop in front of the patron's residence. This gave rise to some difficulty and it was necessary to change the regulations for stops at street intersections only.

J. M. Bosenbury read a paper on some aspects of shop personnel which appeared in the issue of the ELECTRIC RAILWAY JOURNAL for March 19, 1921. John Sutherland, master mechanic Tri-City Railway, Davenport, Iowa, discussed this paper at some length, telling of some of the shop practices followed by his company. He said that all rolling-stock is inspected and oiled on

a fifteen-day basis. During the war, when the company had 312 cars on the system and needed every one of them in service every night and morning, the shop department was given only seven hours each day in which to take care of the inspection and maintenance work. For fourteen months all of the cars, almost without exception, were in service every day.

Several questions were raised in regard to the fifteen-day inspection period. Mr. Sutherland explained that the use of slack adjusters, which had eliminated four men from the inspection force, and the oil wells in the modern motors made this fifteen-day inspection period possible. In addition to the fifteen-day inspection, every car is given a thorough overhaul once a year, whether there is apparent need of it or not. This inspection plan applies only to the cars used in city service. These average from 150 to 178 miles per day, and of the total number eighty-four are equipped with modern motors which Mr. Sutherland believed could run thirty days without oiling if necessary. Questioned as to the kind of oil used, he explained that at the present time both Standard and Texaco were being used and that this is the first year in ten that the company has not had an oil contract.

One of the factors in the excellent results obtained with this infrequent inspection is that all bearings are renewed once a year whether or not this is needed. All armature shafts have been made a standard size so that all bearings are interchangeable and are clamped in place instead of being held with a dowel pin. A good grade of wool waste is used and "teased up" every fifteen days when the new oil is put in. Mr. Sutherland explained that he employed but one armature winder and a helper, and had 1,013 armatures on the property, and that much outside repair work was done also.

Asked why he preferred the time basis to a mileage basis for inspection, Mr. Sutherland replied that the fifteen-day inspection period had been started eight years ago and had been so successful that no change had been made, but he had no preference other than this. In reply to further questioning, he said that the total cost for the maintenance of equipment amounted to about 8 per cent of the gross, or from 2.9 to 3.2 cents per car-mile.

There was also some discussion about the efficiency of labor, and Mr. Sutherland explained that some time ago 40 per cent of the shop force was discharged and that today the production is equal to what it was before.

STARTING THE NEW EMPLOYEE RIGHT

Following a paper on the consideration to be given the new employee, by W. R. Helton, Chicago Elevated Railroads, which appears elsewhere, there was a general discussion of the difficulties and advantages of union labor in electric railway shops, particularly as to the wisdom of promoting union men to supervisory positions. The views taken were quite divergent, the officials of the Chicago Elevated Railroads being quite enthusiastic about the measure of co-operation which they had been able to obtain from union employees, although operating on the open-shop principle.

F. E. Fisher, general superintendent Chicago, Ottawa & Peoria Railway, Joliet, Ill., said that the method of following up the employees recommended by Mr. Helton was especially applicable where the size of the property was large enough to justify the employment of a personnel specialist and the necessary clerical force to keep the records. On the small properties, however, the fol-

low-up work of the new employees falls to a large extent upon the foreman of each department through his daily association and contact. This makes it necessary to select the foremen with great care in order that the best results will be secured. In connection with this follow-up work, Mr. Fisher said that the holding of a school of instruction at frequent intervals for the different departments had been of great value. At these meetings matters of interest to the company and the employees of the department in session at the time are discussed by the heads of the departments, their foremen and the men, resulting in an efficiency through understanding and knowledge which far offsets the cost.

Mr. Fisher said that in his judgment the most important feature of starting off a new employee was, as Mr. Helton had stated, to instill in his mind a favorable impression of the company, his working conditions, the possible opportunity for advancement in his new field of labor, etc. If this is accomplished, the man becomes a satisfied and ambitious employee to start with, and if his efforts are given proper recognition the chances are that he will make a permanent and efficient employee. As evidence of the success attained along this line, he pointed out that the head of every department of his company was a man who had been connected with the company for a long term of years and had worked his way up through the ranks.

Mr. Fisher also commented that the follow-up on employees means more than just watching to see that the proper amount of work is performed in an efficient manner. It means that if an employee is apparently neglecting his work, or if his name is appearing too often on accident reports, something is wrong, that his mind is not on his work. Possibly some financial or family trouble is worrying him, and his foreman or immediate superior should be the first to notice this condition and at an opportune time approach him on the subject in such a manner as to secure his confidence and thus be in a position to help him out, thereby removing the possibility of an accident, or something worse. Co-operation between officials and employees is more than ordinarily necessary at this time in order to insure efficiency in operation.

APPLYING QUICK-TRAINING METHODS TO LINEMEN

At the second session of the electric railway association three papers which aroused a great deal of interest were presented. The first of these was by Theodore Blech, on the subject of "Graduating 'Mike' as a Lineman in Three Months"; the second by Charles H. Clark, on "Labor-Saving Devices of the Maintenance of Way Department and What They Save," followed by a three-reel motion picture showing the construction methods followed by the track department of the Cleveland Railway, and the third by Charles H. Jones, on the results of automatic substation operation. The first and third of these papers appear in abstract elsewhere in this issue. Mr. Clark's paper was abstracted in the March 19 issue.

In reply to questions on the special method of training linemen, Mr. Blech explained that after completing the course the new linemen are divided into classes A and B, while the old, experienced linemen are considered in class C, the three classes having different rates of pay. The class A and B linemen are considered qualified to work on "cold" lines, but they do not attempt to handle any live lines until after they have acquired actual experience in the work. The average age of the

men secured to take the special training work has been twenty-one and one-half years. A good many of them are high school graduates who, it is expected, will make good additions to the engineering department later on. Mr. Blech explained that it was at first hard to interest the men in the work until it was pictured to them in the light of adventure, which has apparently been a successful appeal. The men were paid 55 cents an hour while going through the school at first, but this has now been reduced to 50 cents.

CLEVELAND CONSTRUCTION METHODS PICTURED

Considerable interest was manifest in the construction methods of the Cleveland Railway, and Mr. Clark was asked numerous detail questions, most of which have been covered in various articles in the *ELECTRIC RAILWAY JOURNAL* describing several phases of the track construction work in Cleveland. Summing up the total saving which has been accomplished through the extensive use of machines in this work, Mr. Clark said that since 1910 wages have increased 163 per cent, while the cost of the track construction work has increased but 40 per cent.

Speaking of the advantages of tilting the rail $\frac{1}{4}$ -in. inward, Mr. Clark explained that this overcomes the need for tie rods, causes the wheel to fit the rail so that the wear takes place on the back instead of on the flange side, practically does away with corrugation and saves about 25 cents a foot. The rails are tilted by a special preparation of the steel ties used, which costs about 10 cents extra per tie. The concrete type of track construction is used practically everywhere in Cleveland, except on some short pieces of unimportant track, or where it is impossible to keep traffic off the track until the concrete can set. In these cases the track is tamped up on crushed stone, which is grouted in thoroughly, making practically a concrete construction.

In reply to a question Mr. Clark said that it is necessary to tamp the concrete under the steel ties in order to get a good bearing. Not only is the concrete tamped under the ties as poured, but it is tamped again about 50 ft. back from the pouring point, where it has begun to set. Asked about the standard use of high T-rail instead of girder rail in Cleveland, he called attention to the fact that this type of rail is now \$5 less a ton than the girder rail. He closed his remarks by commenting that the Cleveland Railway was the first to reduce wages in the track department, a reduction from 50 cents to 40 cents an hour having been made.

S. J. Steiner, assistant engineer maintenance of way Aurora, Elgin & Chicago Railway, in discussing Mr. Clark's paper, commented that in interurban work the ditcher is an excellent labor-saving device, since it may be used for loading and unloading various materials as well as for doing its normal work of ditching and shoveling. He spoke also of the saving to be realized from treating ties and said that the number of renewals per year was only about 50 per cent as great with treated ties as with untreated.

C. B. Coates, Chicago Pneumatic Tool Company, spoke of the substantial saving which may be realized from the use of machines for track drilling and driving screw spikes. He described briefly improvements which have been made in the design of the motors used in this work by his company, whereby the free-running or no-load speed of the motors has been greatly reduced. This avoids the burning of drill points at the start and finish

of a hole. He also mentioned the improvement brought about through the use of automatic resetting circuit breakers which avoids any possibility of burning out the motor, without involving delay and annoyance in resetting the circuit breaker. This feature is particularly advantageous when drilling high carbon steel rail. He also spoke of the readiness of the company to develop a dry-drilling tool if a sufficient demand develops.

DISCUSSION ON MR. JONES' SUBSTATION PAPER

A. P. Jenks, General Electric Company, Chicago, commented that the information brought out by Mr. Jones should carry considerable weight with the operating men as to the reliability and ruggedness of the automatic equipment. When the automatic control equipment for railway substations was first put on the market, most every one thought of it only in connection with inter-urban railroads, but its field of application is now considered practically unlimited. He said that in the future the large urban system will be the largest user of this type of equipment, replacing present hand-operated stations, since economies resulting will in most cases show a very handsome return on the investment, justifying the installation on a money-saving basis if for no other reason. It will also be used undoubtedly in an extensive way in connection with the electrification of steam railroads.

Mr. Jenks spoke of the extent to which automatic equipment has been employed and said that the General Electric Company has sold more than 100 equipments ranging in size from 300 to 2,600 kw. A very important installation is being made this year in Australia, consisting of eight 1,000-kw. substations for use in connection with the electrification of one of the steam railroad systems. An extensive installation of automatic equipment is also being installed by the Kansas City Power & Light Company on its Edison three-wire system. This will comprise five substations, four of which will contain two 1,500-kw. converters and the fifth a 2,600 and a 2,300-kw. machine and involve an investment of approximately \$500,000. The automatic control equipment may now be considered as absolutely standard and the manufacturer is prepared to furnish it in capacities up to 5,000 kw.

E. J. Blair, assistant to the president Chicago Elevated Railways, emphasized the point that very good results may be obtained from putting automatic control equipment on old rotary converters, even though they may be of comparatively small capacity, locating them at points intermediate to the present substations. Because of the load-limiting resistances it is possible to keep the converter on the line during what would ordinarily be heavy overload conditions, and this makes it possible for the machine to be operated at a much better continuous load factor and thus enables one to "get away with" a 500-kw. machine where perhaps a 1,000-kw. unit would normally be specified on a new purchase.

S. A. Ralston, Rockford, Ill., and Edward Taylor, E. W. Allen and Hall Roosevelt of the General Electric Company, and Victor Thelin, Chicago Surface Lines, discussed Mr. Jones' paper. A prepared discussion by S. E. Johnson appears elsewhere in this issue. Mr. Roosevelt endeavored to show the members how to go about the rather involved economics of automatic substation installation on large city properties in determining the most economical layout of manual and automatic stations. Mr. Thelin told of the success which

had been had on the Hammond, Whiting & East Chicago Railway with the installation of automatic reclosing circuit breakers at the end of a 30-mile section. The practice here is to depend upon a large substation for the main power supply, while a subsidiary station, in which the reclosing circuit breakers are installed, is started up in the morning, the breakers set, and then left all day without an attendant. This has produced a very substantial saving and involved no trouble thus far. Mr. Thelin expressed the view that it is highly desirable to have resistance in the main rotary converter circuit so that the machine will remain on the line under overload conditions for a reasonable time, but he considered it inadvisable to place resistance in the feeder circuits. His reasoning for this was that it is desirable that the feeder circuit breaker should be thrown out in case the line gets down on the rail, and remain out until the line gang can remove the trouble.

Ralph H. Rice, Board of Supervising Engineers, Chicago, commented briefly on how far the application of automatic equipment should be extended on large city systems and the economics of the number of substations. He said that in Chicago, with thirty-five substations, he thought that this was not a sufficiently large number to represent the most economical scheme. He raised the question of whether in such systems the full automatic equipment should be applied to substations or only certain of the automatic features, contending that where the power is practically never off, some of the automatic features may not be economically justifiable.

CONVENTION CLOSES WITH JOINT BANQUET

The joint banquet of the three associations, held on the evening of March 16, was very largely attended. Rufus C. Dawes, Chicago, acted as toastmaster. In his opening comments he made the point that the investment in the several public utilities is so very enormous that it would be impossible for the public to take on so huge a public debt. He considered it to be to the interest of the public and the investors that the utilities be kept in private ownership and operation, with a complete understanding between public and companies. The speakers at the banquet were the Hon. Ira P. Copley, United States Congressman from Aurora, Ill.; Charles A. Munroe, president American Gas Association; David Kinley, president University of Illinois, and David Gschwindt, president Illinois State Electric Association.

Making Continual Traffic Checks*

BY M. J. FERON

General Superintendent of Transportation Chicago Elevated Railroads and C., N. S. & M. R.R.

DURING each twenty-four hours the Chicago Elevated Railroads operate a total of 2,584 trains and 8,661 cars, or an average of three and one-third cars per train, with a total of 191,000 car-miles per day. During the maximum evening rush hour, which is from 5 to 6 p.m., we carry 61,000 passengers out of the Loop District alone. To take care of the enormous peaks efficiently, we found it absolutely necessary to create a traffic survey organization, consisting of a superintendent of car service with the necessary assistants. The function of the traffic survey organization is the collection and compilation of information concerning

*Abstract of paper presented before Illinois Electric Railways Association in Chicago, March 15, 1921.

traffic characteristics so that the officer in charge of operation will have such information as will lead to maximum operating efficiency.

All our traffic data are collected in the field by men who have no other duties to perform. They are located on the different roads at points where passing trains have their maximum load, and they become very expert at collecting these data. The figures thus obtained are entered on forms and include the number of the first car on each train, the number of passengers in each car of the train and the branch of the road from which the train came or is going to, as the case may be. These data are collected continuously every day in the week, including Sundays, from 6 a.m. until midnight. A survey is taken of the traffic between midnight and 5 a.m., twice each month. After collection, these data are sent each day to the office of the superintendent of car service, where they are compiled and tabulated. The information is there transferred from the daily forms to a monthly form.

The purpose of this monthly form is to show the loading conditions of each train on the road at any time of the day or any day in the month, except for Saturday and Sunday. On these days an entirely different schedule is operated than on the other five days of the week, so that the records for Saturdays and Sundays are kept on separate forms.

These data furnish a picture of just what each train is doing day by day for the month. They also help in the preparation of new schedules. Memoranda are kept also of the weather conditions on each day.

In addition, the number of passengers passing through each station is registered. At heavy stations, readings of the register are taken every five minutes. A count is also taken at heavy transfer bridges.

PRACTICE ON NORTH SHORE LINE

The Chicago, North Shore & Milwaukee Railroad operates a total of 247 trains on week days and 266 trains on Sundays. On week days forty-four of these are limited trains, operating between Chicago and Milwaukee, thirty-two are express trains, operating between Waukegan, Ill., and Chicago, the remainder being local trains running between Evanston, Waukegan and Milwaukee, and between Lake Bluff and Area. On Sundays there are seventy-two trains between Chicago and Milwaukee, thirty-six each way. Of this number thirty-five are express trains between Chicago and Waukegan, and the others are local trains.

The car-miles run on this line are from 17,000 to 23,000 per day. The number of passengers varies from 30,000 to 38,000 on week days and from 38,000 to 45,000 on Saturdays and Sundays. On account of this variation it was found necessary to take a daily traffic survey of this business, but due to the length of the road, it was not practical to collect the data in the same manner as on the Elevated Lines. We therefore supply each conductor with a traffic report form, showing the names of thirteen important stations along the line. The conductor enters up the number of passengers on his train when leaving each station. He turns this card in at the office at the end of his trip with his cash report. These traffic cards are then checked to the number of passengers on the train at any point. The data are then transferred to a monthly sheet. The collection and tabulation of these data is considered one of the most important duties we have to perform.

Graduating "Mike" as a Lineman in Three Months*

BY THEODORE BLECH

District Superintendent Public Service Company of Northern Illinois, Waukegan, Ill.

THE demand for man power which has affected all industry since 1917 had a disastrous effect on the power stations. This was largely due to fixed rates and rising costs, and utilities could not keep step with wages offered by manufacturers. With the ranks of the utility companies becoming depleted, the writer advocated a radical departure from the traditional method of "making" linemen. The transition from a groundman to a lineman usually required from two to four years, as the position of a "hot" lineman was rightly considered a sacred one due to its impending risk and responsibility. It was this need for trained linemen which prompted the Public Service Company of Northern Illinois to put into action a plan of making a lineman out of "Mike" in three months. We were successful in Waukegan with this plan and now are well ahead with the third successive class of initiates.

Waukegan, located on Lake Michigan, is some forty miles north of Chicago and surrounded by a number of large industries. This district, of which the city is a part, known as District A, takes in about 400 square miles of Lake County, comprising about a dozen municipalities. There were four engineers in this district, who, together with the meter foreman and the line construction foreman, constitute the school "faculty."

When the linemen's school was first advertised common labor was paid \$1 per hour. The young man of adventurous vein who wished to acquire good knowledge and a trade that insured him a permanent living was appealed to by two quarter-page advertisements. The newspaper editors gave us an interesting write-up. The response was surprising.

The applicants were addressed as a university would address prospective students. They were promised a three-month college course with the exception that they would be allowed a nominal wage to defray their expenses, with the understanding that upon graduation their rate would be adjusted to conform to the company's standard rate.

Generally speaking, the course comprised a daily lecture and quiz from 8 to 9:30 a.m. and thereafter practical training in the field. Lately there has been added a weekly evening course in which the elements of electricity are explained. This is open to all employees and particularly to the student lineman. The school is in charge of a line foreman who has had seventeen years of experience.

THE LECTURE CURRICULUM

In brief, the following is an outline of the lectures:

Mondays—A meter foreman elaborates the principle of the electric meter, not only from a theoretical but also from a practical standpoint. The meter foreman also teaches resuscitation by the "prone method."

Tuesdays—An engineer handles such subjects as the development of modern alternating current system; changes required by local conditions, such as changing to three-wire system, increasing size of conductors; use of step-down transformers; remodeling existing lines; work order and agreement sketches; Under-

*Abstract of paper presented before the Illinois Electric Railways Association, March 15, 1921.

writers' Code; utilities rulings; transformer connections, external and internal, and discussion of problems submitted by students.

Wednesdays—The district superintendent familiarizes the students with the complete network of transmission lines, explaining the difference in construction. Later he takes up the organization, and other various welfare functions, such as savings fund, pension system, safety organization, N. E. L. A. work and the Co-operative Council (organization of employees and management representatives) and, toward the end of the course, a complete review of the work done by all other teachers is made.

Thursdays—The assistant inspector teaches the principles of electricity, beginning with Ohm's law. He mostly confines himself to theory and carries on a quiz course which leaves every student carefully posted.

Fridays—The chief clerk dwells on the work done by other departments.

Saturdays—The line construction foreman takes up construction work following along the school's previous week's practical work, gives his viewpoints on good work and points to be avoided.

THE PRACTICAL WORK OF THE COURSE

The first day the students are taught the use of pliers and connectors. They are then taken out to the pole yards for the next two weeks. They set first a 20-ft. pole, which they are taught to climb, and then proceed to set six to eight 30-ft. poles which are cross-armed, anchored and wired, both for primary and secondary service. Then the whole line is dismantled and rebuilt.

The third week the class is taught how to hang, connect and remove a 1-kw. single-phase transformer. Later on a regular three-phase bank is installed. All of the above work is on "dead" lines and takes up about one month.

During this period every operation, whether it be climbing, handling of tools, making splices or repairing of cut lines, is drilled over and over again until every man does the work to the entire satisfaction of the foreman. The simple trick of throwing a handline between two wires is practiced until the students hardly ever throw wild.

Beginning with the second month the students start to work on the 220-volt secondary distribution lines. This gives them the first contact with live circuits. They run and repair services, repair secondary lines, straighten poles and pull up slack wires. Stress is put on thoroughness and not on speed, as the object is still training.

Upon completion of the course the men are transferred to the regular line gangs of other districts.

THE COST OF THIS TRAINING WORK

It is difficult to state definitely what the cost of a course has been. The only expense to consider is one month's wages, salary of the foreman and use of truck and driver. After the first month the crew is doing some maintenance work, and so becomes an asset instead of a liability. The truck is utilized mornings to haul freight to the storeroom while the class is attending lecture, thereby reducing the expense materially. The tools are furnished the men with the understanding that they become their property provided they remain in the company's employ six months after graduation.

During the six months ended Feb. 16, 1921, we graduated nine men who are now employed in other districts and the present class is composed of seven men, six of whom will probably graduate.

This experiment is commended to the larger electric companies, where, it is believed, the results obtained will be more far reaching and beneficial.

Introducing the Employee to the Job and Following Him Up*

BY WALTER R. HELTON

Manager Real Estate Department (formerly Employment Manager)
Chicago Elevated Railroads.

THE law of first impressions applies forcibly to the man entering upon a new job. Care in directing the formation of these first impressions is rewarded by a state of mind of the man that makes for better results.

This was illustrated in my own case, when a number of years ago, in following my trade in car building, I secured a job at a car-building plant in Chicago. Here so little attention was paid to my partner and myself in getting us started, and we had so much trouble in finding the needed supplies, that we did not stay long. On the day we left nine other experienced men did the same thing. This shop was advertising for men every day.

Our next job was in the repair shop of one of the largest Eastern railroads, where, regardless of the fact that the work was all done out in the yard, we were satisfied with the work mainly because the foreman and the master mechanic seemed to consider it a part of their job to get us nicely started. To this day the period of employment in that company's service is remembered as pleasant, and a feeling of friendliness exists toward that great railroad corporation.

Every man who enters upon a new job is to some extent handicapped more or less by what might be termed "stage fright," and anything said or done to remove that feeling will react in the man's more rapid attainment of efficiency. His first impression should be that he is more than a mere cog in a wheel. In addition to explanation of the detail of job a brief outline of the social activities of the employees, their interest in the dances, club features, other entertainments, etc., will aid in arousing the interest of the new man and help him to feel that he is one of the family.

When the new man has his "feet on the ground" it is well to go after the production end, at which time the allowances in bonus or other rewards should be carefully explained and demonstrated.

Often a man is left to his own resources after he has started work and is allowed to develop his own line of training incidental to the particular job, shop or organization in which he is engaged. The result of this is lower production, both in quantity and quality. A carefully planned, rigidly executed system of follow-up will invariably pay handsome returns for the time and expense incurred by having some one who is possessed of considerable tact.

The methods of initiation and follow-up as outlined herein are not practiced in detail by the Chicago Elevated Railroads, although a great deal of progressive work has been carried on in this direction by them.

*Abstract of paper presented before the Illinois Electric Railways Association in Chicago, March 15, 1921.

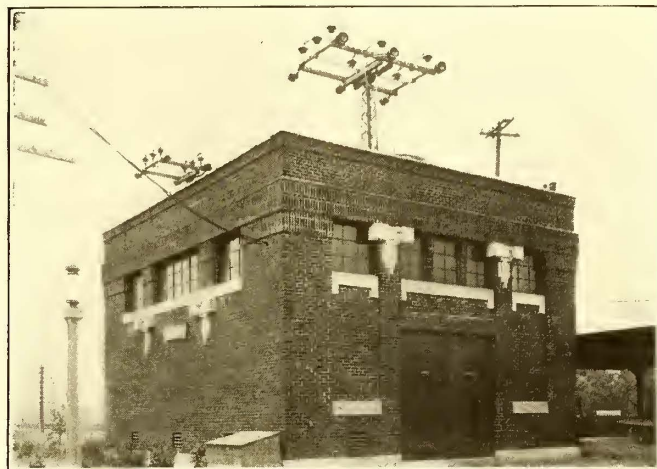
Checking Up On Automatic Substation*

A Complete and Detailed Study of the Functioning of the Equipment in the Substations on the North Shore Line—Counters and Recording Instruments Were Used to Produce a Very Enlightening Record of Operations—Test Runs on Three Stations Show Their Efficiency and the Distribution of Losses

By CHARLES H. JONES

Chicago, North Shore & Milwaukee Railroad, Chicago, Ill.

IN ORDER to handle a very large increase in the business of the Chicago, North Shore & Milwaukee Railroad it became necessary in 1916 to make extensive additions to the power system as it then existed. It was adequate to handle the load of single-car operation, but with the advent of heavy train operation, passenger and freight, there was need for considerable improvement in the trolley voltage. There was on the system at this time 9,500 kw. in rotary converter and 3,000 kw. in step-up transformer capacity and there is now 14,500 kw. of rotary converter and 4,500 kw. of step-up transformer capacity, an increase of 52.6 per cent in converter capacity and 50 per cent increase in transformer capacity. With this equipment it is possible to handle approximately 100 per cent increase in alternating-current kilowatt-hours purchased. This is due to the fact that the new equipment was interspaced between the original substations, thereby reducing the amount of line loss and making available additional power for effective traction purposes. As shown in Table I, the total energy consumption per car-mile has been reduced from 5.78 to 4.31 kw.-hr. This reduction is due to a general



LAKE BLUFF AUTOMATIC RAILWAY SUBSTATION, NORTH SHORE ROAD

Before this method of power development was entered into, consideration was given to raising the line voltage on part of the system to 1,200 volts, but this plan was abandoned on account of the excessive cost of changing car control equipment and old motor equipment. Consideration was also given to the installation of additional feeder copper, but this was also abandoned on account of the heavy cost. In an article published in the ELECTRIC RAILWAY JOURNAL of Jan. 11, 1919, I showed that it would cost approximately \$650,000 to accomplish the same voltage betterment that has been made with interspaced substations, and fundamentally this would have been the wrong method of correction to apply. The existing feeder capacity is shown in an accompanying diagram, no change having been made since before 1916.

Power is purchased from two sources, which at times makes it necessary to do considerable high-tension switching from one power source to another, so that the automatic stations have had rather severe operating conditions.

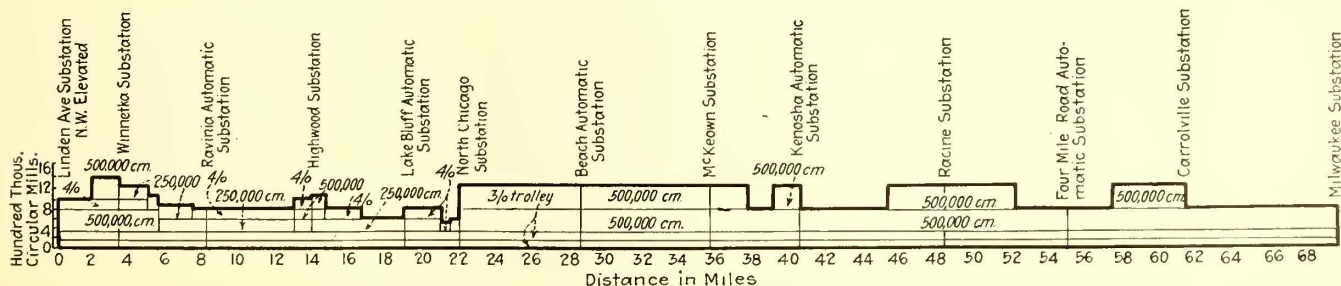
Before going ahead with the installation of automatic substations, a careful study was made of installations already made at that time. Although our sub-

TABLE I—GENERAL STATISTICS ON POWER CONSUMPTION TREND ON NORTH SHORE ROAD

Year	—Car-Miles Operated—		Passengers Carried	A.C. Kw.-Hr.	A.C. Kw.-Hr.
	Passenger	Freight		Used on Interurban System	per Car-Mile on Interurban System
1915	2,450,988	272,088	6,762,518	15,160,975	5.78
1916	2,830,317	348,320	7,459,689	17,892,122	5.83
1917	4,034,352	413,762	10,374,243	23,207,845	5.45
1918	5,355,632	517,744	11,875,249	28,481,021	5.05
1919	6,128,254	457,264	12,425,634	28,309,649	4.67
1920	7,074,419	887,399	13,388,238	29,314,722	4.31

improvement in operating efficiency, one of the factors of which is the substation interspacing but the exact amount for which this is responsible cannot be determined. The other figures in Table I will give a good idea of the rapid growth of the business of the company, and the graphic schedules reproduced herewith will show at a glance the service given for which power must be supplied.

*Abstract of paper presented before Illinois Electric Railways Association in Chicago, March 16, 1921.



FEEDER CAPACITY DIAGRAM OF NORTH SHORE ROAD

TABLE II—BEACH AUTOMATIC SUBSTATION OPERATIONS DURING JANUARY, 1921

Day	Date	Hours Since Last Inspection	Hrs. Sta. Run Since Last Inspection	A.C. Kw.-Hr.	D.C. Kw.-Hr.	Average per Hour										Operations of Station	Remarks	
						Number of Operations of Apparatus Since Last Inspection						Thermostats						D.C. Kw.-Hr.
						Controller	Oil Switch	Contactors			Relay ZTA	19	Res.					
Saturday	1	25-00	18-30	6,625	5,570	21	21	21	50	17	0	0	0	301.1	0.84			
	2	24-00	18-45	6,670	5,610	14	14	14	83	32	0	0	0	299.2	0.583			
	3	23-00	17-30	6,835	5,750	21	21	21	82	64	2	2	0	328.2	0.915			
	4	24-00	17-15	6,045	5,070	21	21	21	65	33	0	0	0	294.0	0.875			
	5	24-00	17-00	5,575	4,670	18	18	18	53	39	0	0	0	274.1	0.75			
	6	24-00	16-45	5,470	4,570	16	16	16	44	14	0	0	0	273.0	0.667			
	7	24-00	17-15	5,510	4,610	16	16	16	49	15	0	0	0	267.5	0.667			
	8	24-00	18-15	5,785	4,830	17	17	17	36	41	1	0	1	264.7	0.708			
Sunday	9	25-00	18-00	6,280	5,260	21	21	21	51	25	0	1	0	292.2	0.84			
	10	22-00	16-15	5,750	4,830	18	18	18	37	11	0	0	0	297.2	0.818			
	11	25-00	16-30	5,875	4,920	22	22	22	69	7	0	0	0	298.1	0.88			
	12	24-00	16-30	5,525	4,620	22	22	22	41	41	0	0	0	280.0	0.917			
	13	24-00	19-00	6,540	5,460	18	18	13	78	72	1	1	1	285.8	0.75	No. 18 contactor counters out of order.		
	14	24-00	18-00	5,840	4,890	15	22	20	62	30	0	5	0	271.9	0.625	Oil switch counters out of order.		
	15	24-00	17-00	5,875	4,930	18	22	18	50	59	2	0	1	290.0	0.75	Oil switch counters out of order.		
Sunday	16	25-00	20-15	7,415	6,240	10	23	10	54	20	0	0	0	308.1	0.40	Oil switch counters out of order.		
	17	22-00	18-30	7,140	6,010	3	6	3	56	13	0	0	0	325.1	0.136	Oil switch counters out of order.		
	18	25-00	18-30	6,530	5,470	13	25	13	57	46	2	13	0	295.9	0.52	Oil switch counters out of order.		
	19	24-00	19-20	6,280	5,270	9	24	9	49	15	0	0	0	272.2	0.375	Oil switch counters out of order.		
	20	26-30	21-00	7,445	6,250	12	20	12	53	77	3	0	0	297.8	0.453	Oil switch counters out of order.		
	21	24-00	16-45	5,680	4,790	24	31	24	43	42	1	5	1	286.1	1.00	Oil switch counters out of order.		
	22	21-30	14-10	4,355	3,660	19	19	19	43	56	2	0	1	258.2	0.883			
Sunday	23	24-00	15-00	5,545	4,620	27	27	27	62	14	7	0	0	308.0	1.125			
	24	23-00	17-00	6,835	5,830	7	7	7	39	98	0	0	0	343.1	0.304			
	25	29-25	21-00	7,440	6,240	17	17	17	52	37	1	0	0	297.0	0.577			
	26	18-35	13-10	4,080	3,400	14	14	14	33	7	0	0	0	258.5	0.753			
	27	25-00	18-45	6,380	5,360	14	14	14	50	31	0	0	0	286.4	0.56			
	28	24-00	17-45	5,460	4,580	16	16	16	30	12	0	0	0	258.0	0.667			
	29	24-00	17-15	5,180	4,320	19	19	19	42	13	0	0	0	250.4	0.792			
Sunday	30	25-00	17-30	5,830	4,900	22	22	22	32	0	0	0	0	280.0	0.88			
	31	22-00	16-30	5,375	4,510	20	20	20	24	12	0	0	0	273.4	0.909			
Totals		743-00	544-55	187,170	157,040	524	593	524	1,568	993	22	27	5	8,915.2	21.919			
Average per day		23-58	17-35	6,037.7	5,065.8	16.9	19.1	16.9	50.6	32.03	0.71	0.87	0.16	287.5	0.707			

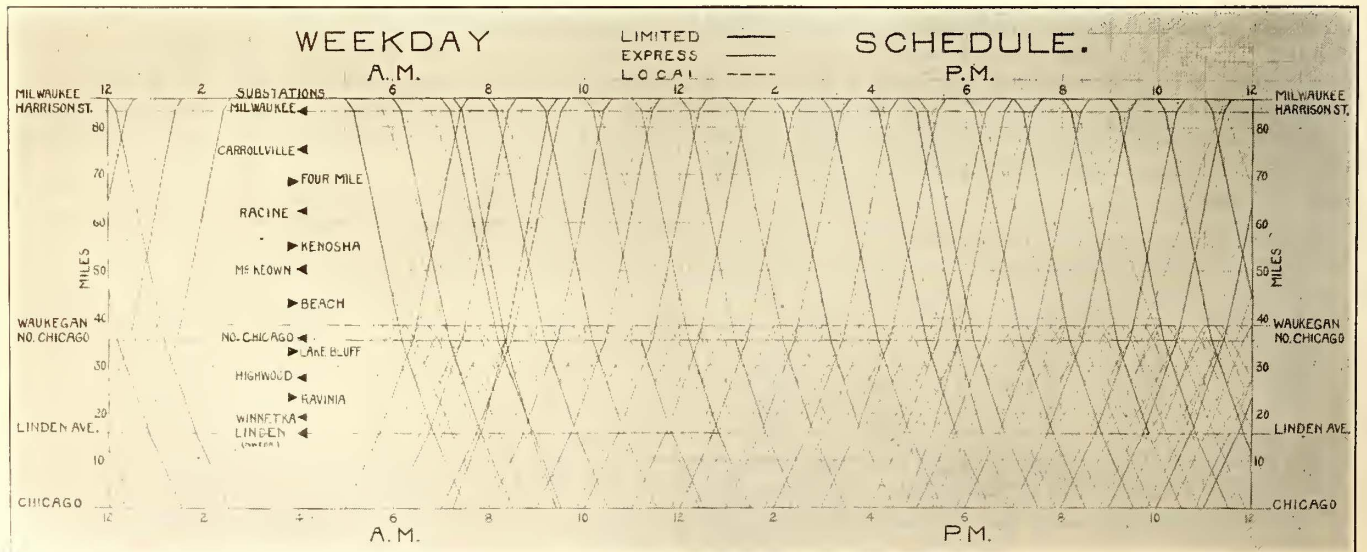
station erection has extended over almost four years, and other installations around the country have been carefully investigated, it has not been found advisable to change the design of building or the layout either on account of these investigations or on account of defects showing up in our own experience. A detail description of our substation design was published in the ELECTRIC RAILWAY JOURNAL in the issue already referred to. An exterior photograph of one of the substations and some interior views are shown herewith.

On account of the rapid growth of the load on our power system it was necessary to install the equipment in a temporary manner as hand-operated stations without waiting for delivery of the automatic control, and they were operated in this way while the installation of automatic equipment was being made. The first stations installed were those at Beach and Kenosha, followed by Four Mile, Lake Bluff, Libertyville and

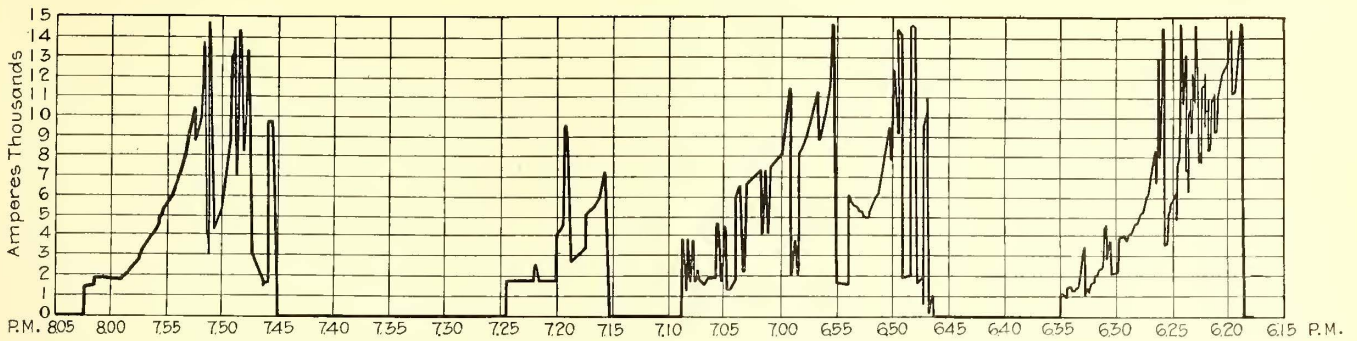
Ravinia; the last is just now being put in service. All of these stations are 25-cycle equipments except Ravinia, which is 60-cycle. All the 25-cycle stations are laid out for 33,000-volt service, but some are temporarily operating on 13,200 volts. The 60-cycle station is supplied from a 20,000-volt line, with provisions for 33,000-volt operation at some future date.

EXACT OPERATING DATA DESIRABLE

From the start it was apparent that it was very desirable to know what occurred in the station between inspection periods. Accordingly, a number of mechanical counters were attached to various pieces of the apparatus in such a manner as to record the number of operations. This gave a very close check on how the station was acting and up to a very short time ago no other checking method was available. However, the General Electric Company has recently devel-



GRAPHIC SCHEDULE OF NORTH SHORE ROAD FOR WEEKDAYS



TYPICAL TWO-HOUR RECORDING AMMETER CHART OF AUTOMATIC SUBSTATION

oped a recording instrument which gives a very complete record of station operation by means of an ammeter element and nineteen recording pens actuated by various pieces of the equipment, as shown in an accompanying illustration.

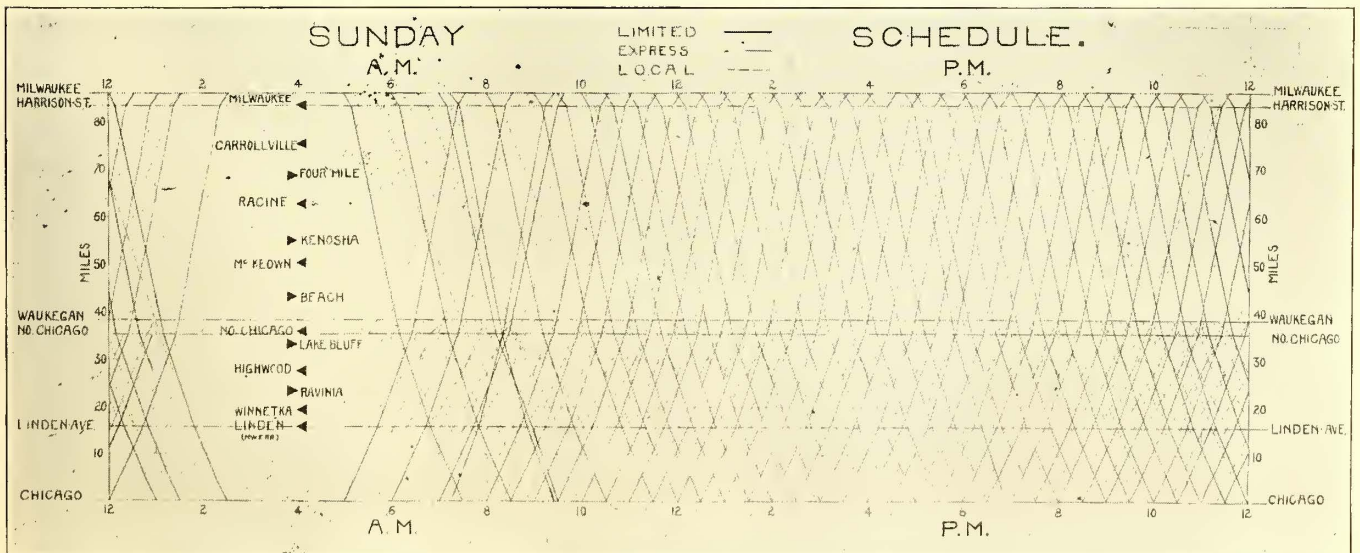
The inspector reads these various counters on daily inspection and enters them on a report card which is sent to the office and tabulated on a monthly sheet, Table II. In this way the various operations of the station can be followed from time to time. It was from records of this kind that the operating statistics of Table III were obtained. In addition to this record a log book is kept in each station in which these same readings are entered daily together with a report on all failures or unusual occurrences. A Bristol recording voltmeter chart is used for indicating station on and off the line and from this the time during which the machine is operating is calculated every day.

From this table it is quite apparent that the stations have been given a very severe tryout and if any

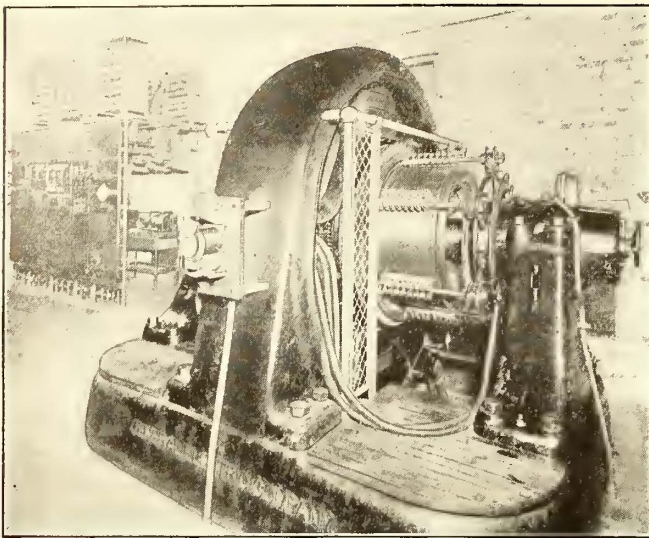
serious defects existed they would have shown up by this time. On Kenosha station, which has made more than 33,000 operations since its installation, there has been no appreciable wear or excessive maintenance on any of the apparatus. In fact, the main contacts on which most of the wear occurs have never been removed, and from our experience up to date it is impossible to determine what the life will be or what the maintenance will amount to. As far as the number of operations are concerned, Kenosha station had had the equivalent of 22.7 years of service in a hand-operated station, assuming four operations per day in such a station. This means a corresponding heavy service on the balance of the equipment and the results speak very well for the correctness of design and ruggedness of equipment. The average load on the Beach and Kenosha substations is considerably higher than would be possible to obtain in hand-operated stations. This is due to the load-limiting resistances keeping down the momentary peaks, thereby making it possible to carry

TABLE III—AUTOMATIC SUBSTATION OPERATING STATISTICS

Station	Size Unit, Kw.	Date Started	Total D.C. Output to Jan., 1921	Total Hours Operated	Total Number of Operations	Total Operations of First Res. Contactor	Average Output per Operating Hour	Average No. of Station Operations per Day	Average Number of Operations of First Res. Contactor per day
4-mil	500	11-2-18	1,948,600	9,712.8	24,709	9,298	200.6 Kw.	31.25	11.62
Kenosha	500	4-15-18	3,310,420	11,005	33,141	29,159	301.0	33.4	29.4
Beach	500	12-5-17	4,926,745	16,854	21,562	56,387	292.0	19.4	50.2
Lake Bluff	1,000	2-26-19	3,782,030	11,726.8	7,196	8,520	323.0	10.65	12.6
Libertyville	300	12-6-19	471,400	6,737	13,980	33,323	70.0	35.7	85.1



GRAPHIC SCHEDULE OF NORTH SHORE ROAD FOR SUNDAYS



INTERIOR VIEW SHOWING LOCATION OF VARIOUS SUBSTATION EQUIPMENT

a considerably heavier load on automatic than on hand-operated stations. While this is a feature which could be applied to manual as well as automatic stations, it is nevertheless a regular feature of automatic equipment and this type of station should be given credit for it.

HOW MUCH INSPECTION IS NEEDED?

Among operators of this type of equipment there has been considerable controversy about the amount of inspection required and it has varied on different properties from daily to weekly. The amount required undoubtedly depends upon the load on the equipment, the reliability expected and seriousness of an occasional failure. From an inspection of our operating records, we believe that with as complicated apparatus as this, which performs so large a number of operations and

where absolute reliability is required, a reasonable close inspection is needed. Hence we are of the opinion that daily inspection is about what is needed, when coupled with recorders which give an indication of what goes on between inspection periods. A typical section of a recording ammeter chart is shown in an accompanying illustration which indicates the character of load on a 500-kw. station. As the automatic substation design is only in its infancy, some failures were to be expected and some changes in design of apparatus required. But from a complete tabulation (Table IV) of these failures on the North Shore Road, it is quite evident that they have been comparatively few in number and of a minor nature. Since the causes have been located, a great many of these sources of trouble have been eliminated entirely. A summary of this tabulation shows that the failures per 1,000 operations of the various stations have been remarkably few. See Table V.

DAILY INSPECTION REPORT					
AUTOMATIC SUBSTATION					
COUNTER READINGS	DAY AND DATE		DAY AND DATE		DIFF
	TIME	DATE	TIME	DATE	
Controller					
0 S O M.					
No. 18 Contactor					
No. 18-A Contactor					
No. 19, 19-A Contactor					
No. 20 Contactor					
No. 20-A Contactor					
No. 21, 21-A Contactor					
No. 20-A Thermostat North Feeder					
No. 20 Thermostat South Feeder					
No. 21 Grid Thermo.					
No. 27 Relay					
Reverse Current					
D. C. Wattmeter					
TOTAL HOURS RUN					
REMARKS					
FORM 327 1M 1-20 A-2800					

FORM OF DAILY INSPECTION REPORT USED ON NORTH SHORE ROAD

TABLE IV—RECORD OF FAILURES OF AUTOMATIC SUBSTATION EQUIPMENT ON C., N. S. & M. R.R. SINCE SUBSTATIONS WENT INTO SERVICE

Name of Apparatus	Nature of Trouble	Permanent Remedy Applied	Numbers of Failures					Total
			Beech Substation	Kenosha Substation	Four-Mile Substation	Lake Bluff Substation	Libertyville Substation	
Time delay cutout relay	Contacts burned	Redesigned relay head and substituted new contact metal	7	1	1	1	1	8
Time delay cutout relay	Coil burned out	Redesigned relay head	1	2	1	1	1	3
Time delay cutout relay	Toggle failed to lock	Redesigned relay head	1	2	1	1	1	3
Time delay cutout relay	Out of adjustment	Redesigned relay head	1	2	1	1	1	3
Instantaneous control relay	Open circuit	Redesigned relay head	1	2	1	1	1	3
Instantaneous control relay	Resistance grounded	Redesigned relay head	1	2	1	1	1	3
Instantaneous control relay	Chattering	New type relay substituted	1	2	1	1	1	3
Instantaneous control relay	Plunger stuck	New type relay substituted	1	2	1	1	1	3
Contact-making voltmeter	Stuck	New type relay substituted	1	2	1	1	1	3
Controller motor	Burned out	Redesigned relay head	1	2	1	1	1	3
Controller motor	Commutator dirty	Redesigned relay head	1	2	1	1	1	3
Controller	Poor contact of a segment	Redesigned relay head	1	2	1	1	1	3
Controller	Brake stuck	Redesigned relay head	1	2	1	1	1	3
Exciter	Polarity reversed	Redesigned relay head	1	2	1	1	1	3
Resistance thermostat	Contact out of pivot	Thermostat redesigned	1	1	2	3	1	7
Resistance thermostat	Contact burned off	Thermostat redesigned	1	1	2	3	1	7
Oil switch	Motor burned out	Redesigned operating mechanism	2	3	1	1	1	3
Oil switch	Guide block broke	Redesigned block and fastening	2	3	1	1	1	5
Interlock on hand reset	Loose contact	Redesigned block and fastening	2	3	1	1	1	5
Hand reset	Defective latch	Readjusted	6	3	1	1	1	6
Field relay	Screw loose on contacts	Readjusted	6	3	1	1	1	6
Field relay	Low voltage—would not close	Coil winding changed	1	3	1	1	1	5
Field relay	Grounded	Coil winding changed	1	3	1	1	1	5
Polarized relay	Poor contact	Contacts changed	2	1	1	1	1	3
Underload relay	Contacts burned	Contacts changed	3	1	1	1	1	4
Underload relay	Stuck open	Contacts changed	3	1	1	1	1	4
A.C. no-voltage relay	Poor contact	Redesigned relay	1	1	1	1	1	3
Reverse-current relay	Burned out-lightning	Redesigned relay	1	1	1	1	1	3
Brush-lifting device	Coasting not enough or too far	Redesigned mechanism	1	1	1	1	1	3
Master relay	Poor contact	Redesigned mechanism	1	1	1	1	1	3
A.C. low-voltage relay	Resistance burned out	Redesigned mechanism	1	1	1	1	1	3
A.C. low-voltage relay	Broken lead	Redesigned mechanism	1	1	1	1	1	3
Load-limiting relay	Stuck	Redesigned mechanism	1	1	1	1	1	3
Load-limiting relay	Bad contacts	Redesigned mechanism	1	1	1	1	1	3
Controller motor contactor	Grounded	Redesigned mechanism	1	1	1	1	1	3
Field contactor	Burned contact	Redesigned mechanism	1	1	1	1	1	3
Totals			9	37	13	46	14	119

TABLE V—SUMMARY OF FAILURES

Station	Total Number of Operations	Total Number of Failures	Failures per 1,000 Operations
4-mile road.....	24,709	13	0.526
Kenosha.....	33,141	37	1.113
Beach.....	21,562	10	0.4638
Lake Bluff.....	7,196	46	6.392
Libertyville.....	13,980	13	0.929

The high average of one failure per 1,000 operations at the Lake Bluff substation, as shown in Table V, is due to defects which have developed in the brush-lifting device. These defects, however, have since been corrected, so that failure from this cause has been entirely eliminated.

From Table IV it is apparent that of the 119 failures, the causes for seventy-four have been eliminated by redesigning pieces of apparatus. The remaining failures are of the usual class found in all complicated apparatus and these can be kept at a minimum only by careful inspection and maintenance.

THE FINAL ANALYSIS SHOWS A SAVING

The final test of whether or not the automatic substation is to remain depends upon its ability to make a reduction in operating expenses. On the North Shore line this has amounted to approximately \$41,351 after charging against the station all legitimate charges such as inspection, interest and depreciation on equipment, and taking credit for elimination of station operating labor and idle running losses, but not for any portion of the reduced line losses. This saving has been made on 10.87 station years of service, or \$3,804 per station year. Expressed on a basis of kilowatt-hours converted, this amounts to a reduction of 0.2863 cent per direct-current kilowatt-hour output.

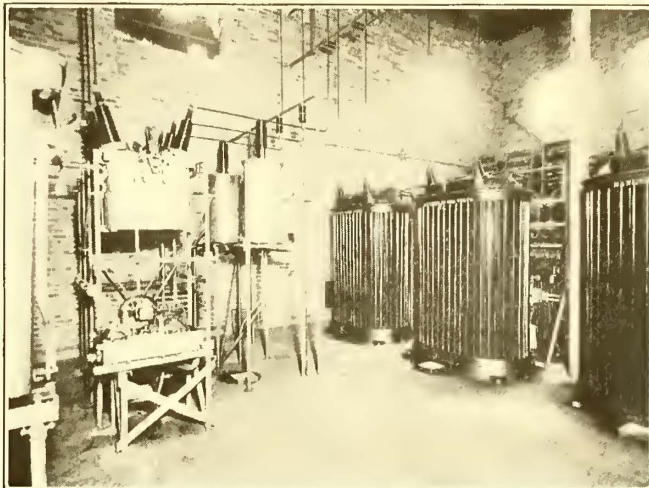
RECENT TEST YIELDS VALUABLE DATA

We have just completed a very comprehensive series of tests of three of these stations in conjunction with the General Electric Company for the purpose of determining exactly the losses which occur in the stations, due to automatic operation. During these tests a great many interesting facts were found which have done considerable toward increasing our confidence in the equipment and the savings which they make possible.

Table VI contains a summary of a forty-eight-hour

TABLE VI—SUMMARY OF 48-HOUR EFFICIENCY RUNS ON THREE SUBSTATIONS

	Kenosha	Lake Bluff	Libertyville
Capacity of converter....	500 kw.	1,000 kw.	300 kw.
Total running time.....	1,271 min.	2,310 min.	2,219 min.
Running time, per cent of total run.....	44.2 %	80.3 %	77.0 %
Number of starts.....	69	4	26
Average length of running period.....	18.5 min.	9.6 hr.	1.4 hr.
Total input to station.....	7,536.7 kw.-hr.	16,080 kw.-hr.	4,108.5 kw.-hr.
Total output from station.....	6,130 kw.-hr.	14,218 kw.-hr.	3,200 kw.-hr.
Efficiency of station.....	81.5 %	88.5 %	78 %
Average load, per cent of machine rating.....	59.7 %	37.3 %	29 %
Time 1st resistor was in cir.....	132 min.	19.3 min.	.....
Time 2nd resistor was in cir.....	23 min.	0.94 min.	.....
Per cent converter output lost in resistors.....	2.2 %	0.48 %	0.2 %
Percentage Distribution of Input to Station:			
Total output to trolley.....	81.5	88.5	78.0
Total consumed by resistors.....	1.86	0.43	0.16
Total consumed by A.C. control, operating.....	0.16	0.11	0.27
Total consumed by A.C. control shutdown.....	0.041	0.006	0.027
Total consumed by A.C. control starting.....	0.016	0.0006	0.011
Total consumed by A.C. control stopping.....	0.003	0.00009	0.02
I ² R and core losses of control transformer.....	0.11	0.07	0.30
Total consumed by No. 32 relay.....	0.01	0.02	0.05
Total consumed by D.C. control.....	.38	.36	.85
Total consumed by converter in starting and going on the line.....	1.04	0.02	0.34
Total losses in converter and power transformers	14.88	10.48	19.99

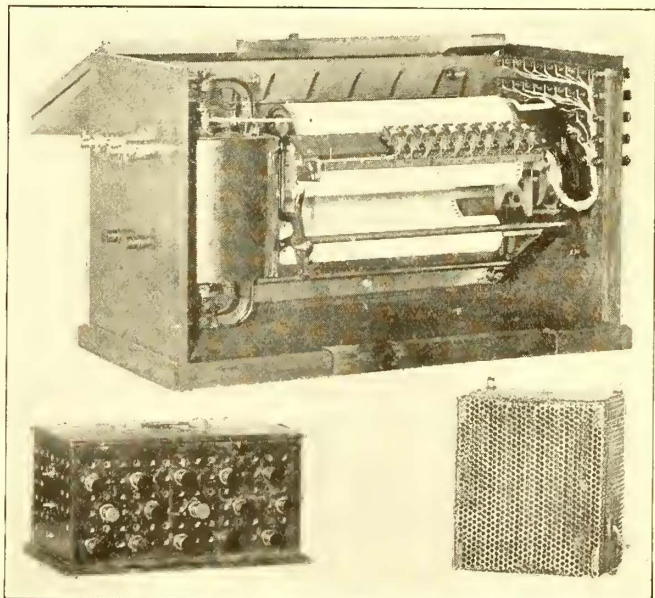


ANOTHER INTERIOR VIEW SHOWING ARRANGEMENT OF SUBSTATION EQUIPMENT

efficiency run made on each of the stations under test, which shows the efficiency of the stations and the distribution of losses in the various parts of the equipment.

The automatic substation has been one of the greatest developments in the railway power field in recent years and its advent has made radical changes in power distribution engineering which are going to result in higher efficiency and better operating conditions on properties where it may be employed. Its field of application is practically unlimited, but the details of application and modification which may be required to suit certain localities are problems which must be studied and worked out for each location. On first consideration the automatic substation appears to be a very complicated piece of apparatus, but when we consider that it performs practically the same function as multiple-unit car control has done for years under much more severe conditions than exist in a substation there is no reason why it should not prove entirely satisfactory.

Our own experience has borne this out and we are very well satisfied with the results obtained.



AUTOMATIC RECORDING INSTRUMENT FOR MAKING RECORD OF AUTOMATIC SUBSTATION OPERATION

A. E. & C. Automatic Substation Experience*

BY S. E. JOHNSON

Engineer Overhead Construction Aurora, Elgin & Chicago Railroad, Aurora, Ill.

MR. JONES' paper treats of a system where there is enough inspection work on the substations to warrant a crew of men for this work alone, and he has been able through his organization to compile data not only very valuable in the efficient operation of his own particular system but which can be used as a basis of calculation for other systems of like character. The follow-up system on causes of failures is especially interesting and valuable to other companies.

On the Aurora, Elgin and Chicago Railroad we have seven manually controlled substations and one automatically controlled. This station was originally manually controlled, but was changed over to automatic in September, 1918. It is located approximately 10 miles from the nearest hand-operated substation. An hourly schedule is operated both ways with trains consisting of one to three cars through the winter. During the summer months very heavy picnic service is operated on this branch, and these trains usually have about six cars.

SOME UNUSUALLY SEVERE OPERATING CONDITIONS

The service under which this station must operate during the summer months is very severe; I believe more severe than automatic substations were originally intended to serve. The starting current drawn by our particular car equipment is heavy and on account of the exceptionally long distance between substations, the automatic equipment must naturally take care of practically all of the current taken by trains until they are well away from the station. This made it necessary to set the thermostat on the line resistance grids so high that the grids would be at red heat before the machine would be cut off. By this means any cars in the vicinity of this substation are given power to move them regardless of overload.

When our station was placed in operation, the matter of regular inspection was given a great deal of study. A careful survey of the practice of other companies in this respect was made, and from the information gathered the period of inspection was found to range from daily to weekly, most companies, however, inspecting daily. We finally adopted the weekly inspection, partly because we had no organization to handle a more frequent inspection, and have followed it religiously since with very good results. In addition, we make an inspection after each electrical storm, though no difficulties have ever shown up. An operator who lives in the vicinity charges the lightning arresters, takes the meter readings and changes the recording voltmeter chart daily, but does no further inspection work.

This procedure soon brought us to the conclusion that we must know what was happening between inspection periods, and we soon developed and installed a special signal device that notifies the train dispatcher in case the station does not come in on the line properly when a demand requires it. This device has allowed us to forget about the automatic station between inspection periods. A record of the number of complete

operations of the station is made by the use of a Bristol recording instrument. We have averaged one failure per 750 operations.

By the installation of automatic equipment at our one station we were able to save \$11.90 per day in labor alone, and I feel certain a considerable amount in repairs, which we are unable to check. The average daily output has increased from 4,000 kw.-hr. per day to 6,500. This is due to the fact that under manual control a train starting at the station knocked out the breaker on the rotary and it was then impossible to close it again until the train was some distance away. Under automatic operation, however, the load-limiting feature permits the station to furnish power to the train continuously. Another advantage is that the service on this branch is improved, as we are able successfully to handle heavier trains under better voltage conditions.

The stations mentioned in Mr. Jones's paper operate a good many times per day, one in particular sixty-nine times. I believe that a station can operate too many times per day. In this particular instance, the station perhaps operated five or six times per hour during rush periods, and if this is true, I believe it would be advisable to install a device that would hold the machine in on the line during this period and thus save the wear and tear of these additional stops and starts.

On our system we have a period between 1:30 a.m. and 5:30 a.m. when there is no train service, but have deemed it advisable to hold the station on the line with a time clock to improve voltage conditions at our shop located about 5 miles away.

Automatic substations are now an accomplishment and no longer an experiment. They are truly reliable, more so in fact than manually controlled stations, and they will show great economy right from the start.

City Bank on Trade Conditions

THE bulletin of the National City Bank for March, 1921, has the following to say on what it calls "the great miscalculation which is tying up trade and industry at this time."

Something has happened that has affected the buying power of millions of people, and other millions are trying to ignore it and think they can go on selling their own goods or services at the same rates as before. Trade is dull and millions of people are out of work because the adjustments that are necessary to restore the equilibrium are not made.

Merchants refuse to reduce the prices of goods they have in stock, and perhaps argue plausibly in justification of their policy, but trade languishes and quicker witted competitors will replace their high cost goods with low cost ones and take the lead in the trade.

Wage earners stand for the maintenance of wage scales, and as the public is unable to buy goods made upon that level of cost, the mills close down or run on half time, with a great loss of wages, without corresponding reduction in the price of the product to consumers, most of whom are wage earners.

The printers of New York City wanted more wages last fall, and a committee of well-intentioned gentlemen selected to arbitrate the case awarded an increase by some process of reasoning which left the state of the printing business and equilibrium between the printing business and the general business situation entirely out of account. The result was that the wage increase, by increasing the cost of printing at a time when the public had less money to spend for printing, aggravated the situation and resulted in a reduction of employment and of actual wage payment.

That illustrates the whole situation. It is shortsighted to be always thinking that the wages can be fixed by simply an agreement between employer and employees. There is a relationship between each industry and all the other industries which must be taken into account.

*Abstract of written discussion on paper by C. H. Jones, abstracted above, read at meeting of Illinois Electric Railways Association, Chicago, Ill., March 16, 1921.

Profitable Conference of N.Y. E. R. A.

At the Quarterly Meeting Held in New York City on March 18 the New York Electric Railway Association Discussed Informally the Safety Car, Freight and Express Traffic and Valuation Matters—Inspirational Address Was Delivered by Homer L. Ferguson

INFORMALITY, frankness and a general willingness to contribute the results of experience were the characteristics of the twenty-fourth quarterly meeting of the New York Electric Railway Association, held at the Biltmore, New York City, March 18. The morning session was occupied by the reading of a paper on "Special Franchise Valuation" by L. R. Brown, engineer New York State Railways, Rochester, followed by an interesting discussion and a conference on "Solicitation of Electric Freight Business," opened by the reading of a contribution by T. H. Stoffel, Westinghouse Electric & Manufacturing Company.

At noon the members of the conference were entertained at luncheon by the association in a room adjoining the conference hall, after which the discussion was resumed with the one-man car as the focus of interest. No formal paper on this subject was presented. The program closed with an address on economic conditions and tendencies by Homer L. Ferguson, president Newport News Shipbuilding & Dry Dock Company, Newport News, Va.

Mr. Ferguson's remedy for the present condition of affairs is greater industry and economy in production, greater thrift and deflation of costs. Prices are not fixed by a mysterious influence, he declared, but by the laws of trade and finance. Waste and inefficiency in production must be removed. Overhead expenses should be reduced, companies must expect less profit and labor has to do its share in cost reduction, if this country is to meet world competition.

The usual evening banquet following the conference was omitted.

Mr. Brown's paper and the resulting discussion are abstracted below. A report of the remaining discussion will be given in a later issue.

Special Franchise Valuation

BY L. R. BROWN

Engineer New York State Railways, Rochester, N. Y.

THIS is an age of valuation. It is also an age of taxation. The two go hand in hand. The laws of New York State have for many years required each public service utility to submit each year a valuation of all its property, both real and personal, together with a report of gross receipts and operating expenses. The object is to furnish the state tax commission with information from which it can determine the value of the franchise.

Besides being of use to the state tax commission, this tax report furnishes an excellent opportunity for each company to make a valuable inventory and valuation of its property. For this purpose it should be very carefully prepared and revised each year. The electric railway companies of the State, especially the up-State companies, have not yet fully realized the importance and value of this report.

The tax commission at Albany is a very just and considerate one and has on its staff able engineers who are willing to give any company the best advice and aid in making the valuation as called for, and in compiling other information for the report. The commission allows each company to make its own valuation but insists that this be fair and reasonable. The commission advises that this valuation should approach original cost but recognizes the fact that most companies are unable to produce original cost figures and so has asked for "Cost to Reproduce New" and also for "Present Value Allowing Depreciation." By "Cost to Reproduce New" it appears that the commission means the cost to reproduce the property in its present condition but using unit costs that prevailed at the time the property was constructed, or at least using prices not inflated by the war.

The following is the "net earnings rule" which the commission applies to valuations and data submitted in the reports made by the various companies to determine the value of special franchises for tax purposes:

General Application.—From the gross receipts derived from the operation of the property deduct the operating expenses and a fair return upon the value of the tangible property, real and personal, necessary to the operation of the plant. The amount thus remaining should then be capitalized at a reasonable rate per cent to ascertain the intangible value which attaches to the operation. To this intangible value should be added the present value of the tangible property in the streets. The sum of this intangible value and the tangible value represents the value of the special franchise. This is a simple statement of the rule. Its application, however, requires some further elucidation.

1. The operating receipts should exclude all receipts that are not derived from the operation of the franchise; for example, the receipts derived from the operation of pleasure parks, sale of concessions, etc. Rents of lands and buildings not necessary to the operation of the franchise should also be excluded. In like manner the corresponding expenses in the conducting of these outside enterprises, which are dissociated from the operations under the franchise, should be excluded from the operating expenses.

2. The value which represents the investment in these outside enterprises should not be included in the value of the tangible property upon which the return under the rules is allowed.

3. The operating expenses should include taxes and a fair sum representing annual depreciation to a plant and equipment, which annual depreciation may not be covered by renewals and repairs during the year.

4. The rate of return to be properly employed must be determined upon the facts governing the degree of hazard or reasonable confidence in the enterprise, not being based upon speculation but upon the facts as demonstrated in the conducting of the business.

5. The rate per cent used for capitalization is usually assumed at 1 per cent rate higher than the rate of return, to compensate or allow for the uncertain circumstances which may be involved in the general question of appraisal.

6. If the nature of the business conducted is of such a character as to require an unusual amount of cash to be kept on hand as representing a working capital and therefore not available for investment or for dividends, it is proper that a reasonable amount of cash working capital should be included in the amount upon which the return is allowed. The amount of such cash must, of course, be determined by experience and knowledge of the actual requirement of cash for that purpose.

7. In determining the value of the tangible property, development expenses are not to be included, neither is the expenditure for paving, which attaches to the first cost of the installation of the plant to be considered a part of the value of the tangible property, although the amount which is actually expended for paving may rightfully be included in the amount upon which the return is allowed. However, after the intangible value has been determined, the item representing the cost of paving is not to be included in the value of the tangible property in the streets when the value of this tangible property is added to the intangible value to give the amount representing the value of the special franchise.

8. The intangible value attaching to the property as a whole having been determined, a proper apportionment of that intangible value must then be made as between that part of the intangible value which attaches to the operations in the streets and highways and that part of the intangible value which should be fairly attributed to the operations upon private right of way. The most equitable apportionment of such intangible value is necessarily upon the basis of per cent of gross receipts derived from the operations in the streets and highways and the per cent of such gross receipts as is derived from the operations upon private right of way.

9. The proper intangible value attributable to the special franchises having thus been ascertained, a still further apportionment of this intangible value must be made between the different tax districts where the property used in connection with the franchise is represented in more than one tax district. This apportionment between districts should also be made upon the basis of gross receipts derived from the operation in each tax district.

10. The value of the tangible property used in connection with the special franchise must, of course, be ascertained for each tax district and the value of such tangible property be added to the intangible value ascertained for that tax district to form the special franchise valuations for a particular tax district.

11. It frequently occurs that there are circumstances and conditions which may be peculiar to any one property, such as burdens upon the franchise imposed by the authorities who grant the franchise, as well as other circumstances and conditions surrounding the property which must be considered in connection with the application of the rule. The net earnings rule must, therefore, be applied with great care and must be employed with sufficient elasticity and judgment as will insure a fair and equitable determination of the value of the franchise.

An important fact concerning the application of the rule is that the net earnings used are the average net earnings over a period of five years and not the net earnings for the current year. This method avoids any great variation in franchise valuations and taxes, because the net income which is bound to fluctuate is the main determining factor in computing the franchise valuation under the rule.

Valuation for tax purposes is entirely different from valuation for rate-making purposes, and the two should not be confused. For tax purposes, the commission wants a stable valuation using unit prices ranging over a considerable period of time so as to represent as nearly as possible the investment cost of the property. The values furnished to the state tax commission by the companies should not include intangibles, for these are taken care of by the intangible value computed by the commission from the net earnings. Valuations for rate-making purposes on the other hand have been generally recognized to include certain intangible values such as "going concern" and "cost of financing." The proper basis of unit prices to use on a valuation for rate-making purposes apparently has never been definitely decided upon but it seems logical to assume that a company be permitted to earn a fair return on a valuation based on prices obtaining over the period of time during which the rates are in force. Thus it will be seen that valuation for tax purposes and for rate purposes are two very different propositions.

In 1917 the New York State Railways had an appraisal made of its property on a "cost-to-reproduce-new" basis using pre-war prices, most of which were based on a price trend extending over a period of ten years or more. The New York State Railways are a consolidation of some fifty original companies for most of which there are no cost construction data. Not only that but a considerable amount of the property has been reconstructed since the original construction. This valuation made by a competent engineering firm formed the only basis to indicate the real worth of the property. It also gave the company for the first time what was really its actual value.

The value of the property, which had been reported to the state tax commission each year, was considerably less than the new appraisal value even when the intangibles were not considered. Realizing this a meeting of the officials of the company was called and it was decided that in fairness to themselves and to the public the values in the tax report should be changed to agree with the appraisal of the property even though it might mean an increase in the taxes paid by the company. No intangibles were included in the tax report but the values included items of overhead covering such costs as legal expenses and interest and taxes during construction.

To show the reasonableness of the prices used in the appraisal and subsequently in the tax report, several of the principal elements are here listed:

Girder rail per ton.....	\$39.60	Copper base per pound.....	\$0.185
T-rail per ton.....	30.40	Concrete per cubic yard.....	3.27
Untreated wood ties each.....	0.67	Common labor (city), per hour	0.204
Yellow pine lumber, per M.ft....	42.75	Common labor (interurban),	
Steel-shapes per ton.....	28.80	per hour.....	0.184
Brick pavement per sq.yd.....	2.30		

Using these unit prices one mile of standard track construction without pavement and consisting of 7-in. plain girder rail, wood ties and crushed stone ballast cost about \$28,000. This included about 35 per cent of tangible overhead which was added to the field costs.

When these figures were submitted to the state tax commission in March, 1918, they reasoned that it would be unfair to increase the New York State Railways valuation when the values that had been previously submitted were already as high as those submitted by other electric railways in New York State. At the suggestion of the commission, the New York State Railways are this year reducing the tangible overhead costs from 35 per cent to 20 per cent of the field costs, but the cost per mile will still be higher than the other roads of the state. Unit prices of material given on the reports of other companies agreed very closely with those of the New York State Railways. Discrepancies were found to be due to the very small labor costs for excavation and grading and for track laying and surfacing. Figures of thirty cents per foot of single track were used in some cases for track laying and surfacing in city streets. Another reason other companies reported lower figures than the New York State Railways was because they had entirely omitted such field costs as tools and construction appliances, superintendence and field accounting, inspection, liability insurance, contingencies and omissions. Likewise they had omitted altogether or used very small percentages to cover overhead costs such as legal and administration expenses and interest and taxes during construction.

A careful study of the net earnings rule of the state

tax commission shows that an increase of valuation on the tax report does not necessarily increase the franchise valuation. Whether it is increased or decreased depends upon the relation of the "Present Value Allowing Depreciation" of the property to the net earnings. If the net earnings are very small, say almost zero for a period of five years, then the intangible value as computed according to the net earnings rule would be zero. In this case the franchise value would equal the "present value" as reported on the tax report and any increase of the one would increase the other. On the other hand, if the net earnings were reasonably large and the valuation small, then an increase in values on the tax report would increase the allowable return and thus reduce the net earnings. This would decrease the intangible value of the property which when added to the tangible property according to this rule might give a franchise value less than before. Generally speaking, a change in the value of the property on the tax report will have but little effect on the franchise value for what is gained or lost on the tangible will be offset by a loss or gain on the intangible if the net earnings rule is rigidly applied.

If to increase the values on the tax report to a reasonable figure would have very little effect upon the taxes it would seem good policy for the electric railways to revise their tax valuations. Would the electric railways of the state be willing to accept a fair rate of return on the value of their property as they themselves report it to the state tax commission? Can the companies reproduce their lines new for anywhere near the amount reported on their tax reports even with unit prices prevailing ten years ago? Why should not the electric railways of the state get together on this proposition and report fair increases in their taxes?

DISCUSSION OF MR. BROWN'S PAPER

The discussion on the above paper included three distinct items: (1) Valuations on a reproduction basis, (2) franchise tax as compared with a gross earnings tax and (3) paving requirements.

It was said that the franchise tax now assessed is a more favorable method of taxation than the gross earnings tax, which even if only 1 per cent would in many cases figure about the same as is now being paid by most companies in New York. If it were 2 per cent the amount would be more except in the case of the Interborough.

As things are now, the tax commission uses some discretion in cases where companies cannot meet the assessments and has only recently granted the Brooklyn Rapid Transit Company a \$10,000,000 reduction in the value of its franchises. Under the gross earnings tax there could not have been any such relief. The real trouble with the franchise tax is in its administration. The tax itself is satisfactory. The companies which feel they should have a reduction in this tax should send their operating men to explain the facts to the commission and not depend upon a lawyer for this purpose.

It was further pointed out that in the valuations submitted to the tax commission care should be taken to see that only such property as is actually in service is included. Deductions should be made for obsolete equipment and also for power plants, when power is purchased. In figuring depreciation, the straight-line method should be used and full information covering such deduction should be attached to the report. In

figuring property value the commission has to work on an average per mile of track and if companies figure too low or too high, such an average is affected according to the method of weighting used.

The need of valuations has been overlooked in the past, but it must be borne in mind that valuations for taxation, rate making and issuance of securities differ, due not to the inventory but to the inclusion of various "overheads," depending upon the purpose for which the valuation is made.

Figures for the value of railway property should be kept by the railway and the tax commission in a uniform manner, first according to the Public Service Commission allocation of accounts and then subdivided further according to municipalities through which the railway operates.

PAVING REQUIREMENTS

Paving requirements under the present law compel the street railway to pave and maintain between its tracks and for 2 ft. on either side. In the discussion these requirements were held to be unfair, as there is no valid argument why a railway should lay pavement only to have this worn out by others. The rails in the streets are really of advantage to a community, for heavy trucking can track these rails. Then, too, in winter with snow on the ground they provide a highway, while at other times the parking of vehicles at the sides of the street drives the traffic onto the railway strip. Two bills on paving are now before the State Legislature, one of which repeals the present law, while the other makes it more onerous. The paving situation, especially along state highways, should be, it was said, under a new commission, and the present law repealed. If the actual facts could be presented to the Legislature, some relief, it was believed, might be obtained, and it was voted to refer the whole subject of paving to the association's legislative committee.

Attention was also directed to a bill now before the Legislature, which, while only applying specifically to the Borough of Queens, might after passage be construed to apply elsewhere. This bill gives the local authorities in Queens the right to compel relocation of tracks even though the railways had laid their rails where ordered by previous municipal authorities. The reason for this is the refusal of the New York & Queens County Railway to change from an unpaved side location to a paved center location on a street that was being improved with paving.

A speaker asked if it was possible for the State highway maintenance tax to be saddled upon the trolley lines by the various municipalities. It was held to be a legal matter and attention was called to the bill now before the Legislature which, while it was believed to be unconstitutional, would allow this maintenance tax assessment to be passed along to the railway the same as any other assessment.

In Massachusetts, it was brought out, the law requiring the railways to pave between the tracks and outside had been repealed. The railways now maintain pavements only where it is so specified in their original franchises. As for changes in grade, location, etc., required due to state highway construction or reconstruction all such expenses are borne by the state except the renewal of ties, rails, etc. The railway company usually does its own work and renders bills for the proportion to be paid by the highway commission.

New England Outlook Is Bright

Speakers at Club Meeting Refer to Better Conditions—
Governor Cox Elected Honorary Member
of New England Club

THE twenty-first annual meeting and banquet of the New England Street Railway Club were held on Tuesday of this week at the Copley-Plaza Hotel, Boston. Edward Dana, general manager Boston Elevated Railway, was elected president of the club for the coming year. The other officers chosen were: Vice-presidents Ralph D. Hood, Haverhill, Mass.; W. J. Flickinger, New Haven, Conn.; T. H. Kendrigan, Manchester, N. H.; T. B. Jones, Burlington, Vt.; Alfred Sweeney, Lewiston, Me., and Walter C. Slade, Providence, R. I.; secretary, John W. Belling; treasurer, Fred F. Stockwell; members of executive committee, I. A. May, C. H. Wood, W. W. Field, F. B. Walker, L. P. Morris, A. A. Hale and L. D. Pellissier.

There were about 400 guests at the banquet in the evening. I. A. May, retiring president, presided and introduced his successor, Mr. Dana, who after expressing his appreciation of the honor of election said he wished to be of service to the club and pledged his best efforts throughout the coming year. Continuing he said:

"If I lived in the past I would fancy myself arguing before the old Public Service Commission about plans which would save money and still give better service, and waiting months for a decision, instead of presenting facts to a Board of Public Trustees who act promptly and get results.

"The members of this club have been a credit to the industry during its years of uphill fight and now that the future promises to be so bright I know that I will have the co-operation of every single member (and some new ones also) in the effort to make the record of this year one of continued progress and greater results."

The assets of the club were reported by President May as \$4,000, including more than \$3,000 in cash.

The toastmaster was Alonzo R. Williams, general counsel Rhode Island Company, Providence, and a descendant of Roger Williams, who was referred to as a pioneer in interstate commerce. Mr. Williams gave a humorous account of the qualifications of a railway attorney and was very happy in his presentations of the other speakers. At the conclusion of his introduction of Governor Cox of Massachusetts, the Governor, on motion of Ralph D. Hood, was unanimously elected an honorary member of the club. The only other honorary member of the club is Past-President William H. Taft.

Governor Cox expressed his pleasure at this election and also at the note of optimism in Mr. Dana's address. Too often today, he said, we hear predictions of failure and despair, but in his opinion there are just as great opportunities today as ever for those who are willing to give service.

Mayor Andrew J. Peters of Boston, who spoke next, voiced the thought that there is now a clearer understanding by municipalities of the needs and possibilities of service of local transportation companies, and he declared that no contract between two such organizations can be successful unless it is to the advantage of both sides.

Senator S. P. Spencer of Missouri, the next speaker, referred to the difficulties which the electric railway industry had experienced during the last few years and to the recognition by the Federal Electric Railways Commission of the essential nature of the service and

the need for a sympathetic understanding of the problems of the industry by the public. He then discussed pending immigration legislation.

The toastmaster then called upon Arthur Gaboury, superintendent Montreal Tramways. Mr. Gaboury referred to the visit of the club to Montreal last June and suggested that the club this summer might like to go to Quebec, visiting Montreal on the way. The meeting closed with a vote of thanks to the speakers, proposed by President May.

Is Public Ownership Inevitable?

THE principal speaker at the meeting of the Philadelphia section of the American Society of Civil Engineers, held on March 7, was William S. Twining, director of city transit, Philadelphia. While the address related in part to the local transit situation, the speaker took the occasion to outline the results of his broad study of the subject of urban transportation in general, and its relation to municipal government as at present constituted. Mr. Twining said that although he has been considered by some as favoring municipal supply of transit service, he does not favor this under present form of governmental administration, but he believes that because of certain conditions which he outlined public ownership is inevitable in large cities. Service at cost, he considers, is simply disguised public ownership and operation, for the private corporation under such conditions is no longer a free corporate agent, but a de facto agent of the public. The service-at-cost plan is simply a halfway station on the road to public ownership and operation, a temporary expedient aiming to utilize existing machinery for transit service while governmental machinery is being evolved.

According to Mr. Twining history shows that transit development is proceeding in three fairly well-defined stages, as follows: The first was the era when transportation was considered a private business with which government had little or no concern; the second stage was inaugurated when transit service began to be regarded as a semi-public business, as it is regarded today. The third and final stage, only recently entered upon, is that of its universal recognition as a public business and function of government. Today transit service is in an unsettled condition principally because of the conflicting opinions as to its nature. Paraphrasing Lincoln, transit service cannot exist half government and half industry. The public would not countenance any proposal to abolish governmental control, so that the only alternative is full public ownership in the supply of the service as a branch of municipal activity.

Under the Public Service Company laws of Pennsylvania, for instance, the state assumes responsibility for the quality of the service to be rendered by the corporation and determines what are reasonable rates for the service, so that the management to all intents and purposes is state management. But if the capital used in public service is practically placed under the care of the state and all business risk disappears, the necessity for stockholders also disappears. If with commission regulation, we must submit to all the disadvantages of public management, complicated by functioning through corporate officials, why not simplify the relationship by having public management function direct?

Mr. Twining thinks also that the report of the Federal Electric Railways Commission is pessimistic as to the continuance for long of private ownership.

Safety of Passengers in Steel Cars*

Analysis of a Large Number of Accidents to Cars Shows that Their Superstructures Should Be Strengthened—Wire Cables Appear to Offer an Effective Means of Arresting Progress of an Invading Car Before It Penetrates Far Into the Structure

By FRANK M. BRINCKERHOFF

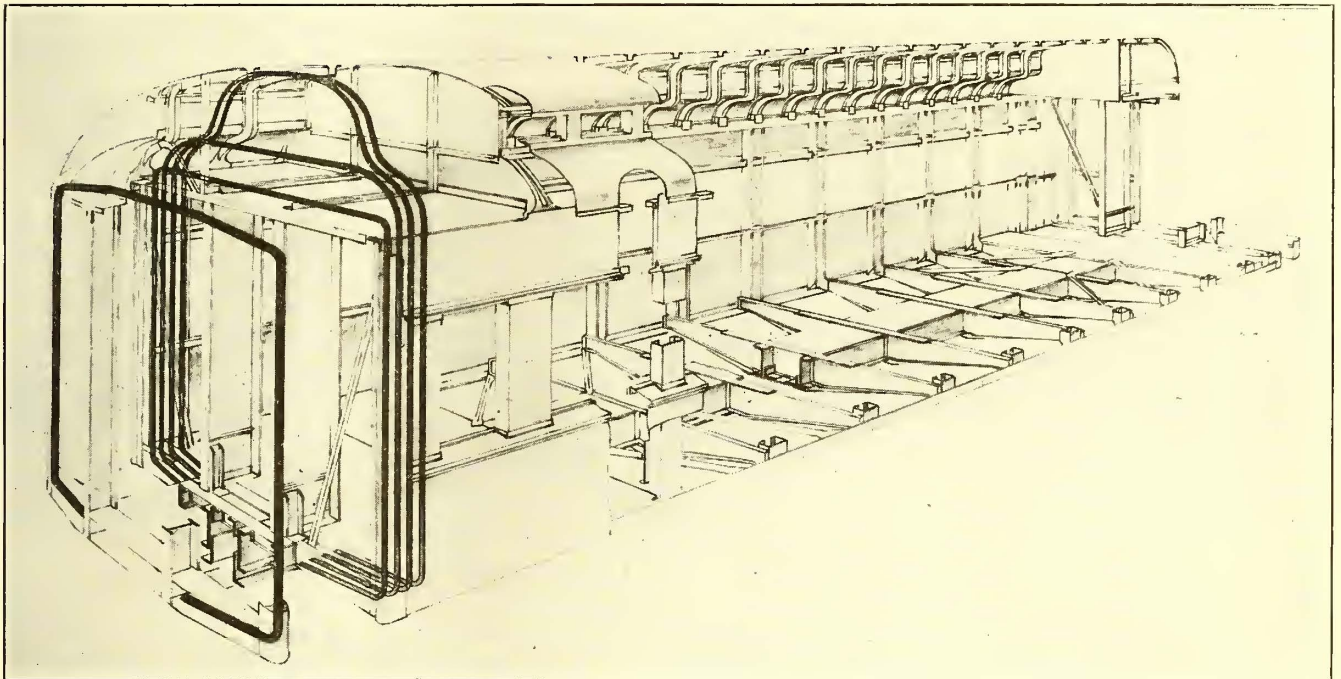
Consulting Engineer, New York City

THE general adoption of steel in place of wood in the construction of passenger train cars some fifteen years ago marked a distinct advance in the art of car building. Various problems arose during the change, and many have been successfully met. The two most important problems to be solved were and still are safety of passengers and weight of complete car.

That some steel passenger cars are heavier than the wooden ones which they displace in service seems to

evolution from the all-wood car to the all-steel car should be gradual. It is now possible, however, to examine the photographic records of typical accidents to passenger trains and profit by past experience when designing and building new equipment.

Examination of many illustrations of accidents of the derailment and sidwiping class soon led us to the conclusion that distribution of metal which would strengthen the superstructure of the car as compared to the strength of the underframe was highly desirable.



PERSPECTIVE VIEW OF CAR FRAMEWORK, SHOWING PROPOSED ARRANGEMENT OF CABLES FASTENED TO CENTER SILL

be indicated by the significant fact that the adoption of steel passenger-train cars was frequently accompanied or closely followed by the purchase of heavier locomotives to handle the new passenger equipment.

With regard to the problem of safety of passengers, I wish to give in condensed form the results of an extended investigation of the behavior of passenger train cars when derailed or in collision and to point out that, while the steel structure affords much greater safety to passengers than did wooden car bodies, modifications can be made in the superstructure of steel cars which will greatly increase their ability to resist destructive shock.

It was natural that the early design of steel car structures should follow conventional lines and that the

During the last ten years or more, 315 cars have been built according to a system evolved by us, with the purpose constantly in mind to produce a car body structure of great strength but still of a weight not in excess of wooden car bodies of similar size and equipment. The side-frame members of these cars are organized in the form of a girder extending from the side sill to the side plate at the roof line, a height of 7 ft. 6 in. or more. The underframe of this system includes center sills adequate to sustain the shocks of collision, draft, etc., but instead of being of the fish-belly type designed to be self-supporting between truck centers, as is the usual custom, the center sills of this system are uniform in section throughout their length and are supported approximately every 6 ft. by heavy cross-bearers between the high girder side frames. The center sills, being thus supported, have no measurable deflection and are therefore superior in capacity to

*Abstract of a paper presented before the New York Railroad Club, March 18, 1921, followed by a summary of the resulting discussion.

resist end shock to those of much greater weight and depth which are self-supporting between bolsters. By this co-operation between side frames and center sills a great reduction in weight per car is accomplished and yet a much stronger body structure results.

The ends of the bodies of these cars are reinforced against the stresses of impact to an extent considered appropriate to the service in which the cars are employed. Some of those cars being electrically operated in tunnel service, others in suburban steam and suburban electric service, others in through line steam service at high speeds and in heavy trains.

The system of reinforcement of the ends of the car body co-ordinates the body end walls with the members of the high girder side frame and roof in the form of a rectangular tube with ends barred to prevent penetration by an impacting body. This is accomplished in the through-line car by the introduction of two new members.

1. An anti-telescoping tie plate extending across the car from side plate to side plate and lengthwise of the car for about 6 ft., forming a flat ceiling for the lava-

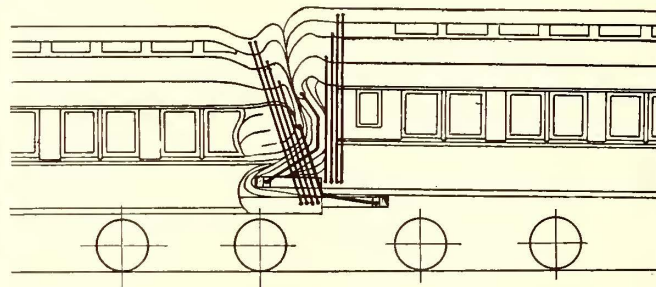
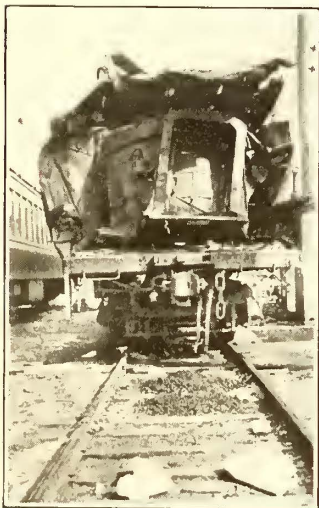
pared with the heavy underframe of the invading body.

4. The joints connecting the side walls, hood and roof are subjected to tension because the invading body having penetrated between the side walls, exerts a bursting stress on the invaded structure. The members composing the roof are always light in section and the joints connecting them to the side walls equally inadequate to resist the heavy tension stress of collision.

5. The structure of the invading car is subjected to compression, and as the joints connecting its members are better able to resist compression than the invaded car structure is to resist tension, the invading car body is seldom seriously damaged.

Accurate computation of the forces expended in a collision between trains is practically impossible. Two reactions, however, occur in all rear-end collisions, which can be used roughly to gage the violence of the shock, namely: (1) Depth of penetration by the invading car, and (2) the distance the standing train is driven ahead by the force of the collision.

With these reactions in mind it seems highly desirable that the invading car be restrained from penetration

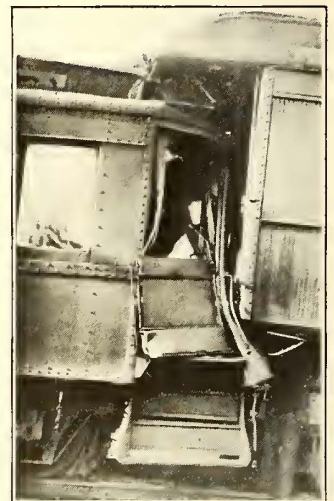


TYPICAL VIEWS OF RAILROAD WRECKS AND EFFECT OF PROTECTIVE CABLES IN RESISTING PENETRATION

At left, the joints connecting the side walls, hood and roof are inadequate to resist the bursting stress exerted on the invaded structure by the invading body.

At right, the underframe of the invading car over-rides the underframe of the invaded car, the point of contact being a foot or more above the floor.

The sketch in the center shows the effect of the protective cables in resisting penetration of one car by the other.



tory, passageway and saloon and being securely riveted to the plate of the high girder side frame.

2. Special deep piers forming the posts for the door in the end of the car body. These piers are approximately 21 in. deep and, as in some classes of accident they may be subjected to tension, the web plates of these piers pass through the upper tie plates and also through to the underframe and are together with their flanges securely riveted to each of these members.

The corner posts and the adjacent side posts of the car body are also specially designed to withstand the shock of cornering collision.

Careful analysis of some typical photographic records of railway wrecks lead to the following conclusions:

1. The underframe of the modern steel passenger car is adequate to withstand the shock of the most violent collision.

2. The underframe of the invading car over-rides the underframe of the invaded car and wedges its side walls apart, the point of impact being a foot or more above the floor according to the upward angle assumed by the over-riding underframe.

3. The superstructures of steel cars fail to protect the passenger space, when over-ridden in collision by a car having a steel underframe, because of the relative weakness of the invaded superstructure as com-

pared with the heavy underframe of the invading body.

The problem is to provide means to arrest the progress of an invading car before it penetrates deep into the structure, meantime transmitting the force of the collision to the standing train to set it in motion.

The essence of this problem is the element of time, and the structure best adopted to solve the problem must contain members which will act to resist penetration at the vestibule end and interpose a rapidly increasing resistance to the progress of the invading car.

The essential characteristics of a member best suited to accomplish the above ends are: (1) Flexibility to avoid shearing; (2) elasticity to avoid abrupt stressing; (3) high ultimate strength in tension to resist the bursting stress exerted by an invading car.

Manifestly the material best adapted to meet the above requirements is wire cable. The manner of introducing the wire cable in a car structure may vary considerably. One form may be as follows:

A wire cable anchored to the underframe of the car passing through the vestibule buffer sill, up through the vestibule corner post, across the hood, down the opposite post, through buffer sill to anchorage point at underframe.



THE PENETRATION OF THE LOCOMOTIVE SELDOM EXTENDS THE DEPTH OF THE VESTIBULE. THE GREATEST DAMAGE OCCURS WHERE ONE CAR OVER-RIDES ANOTHER

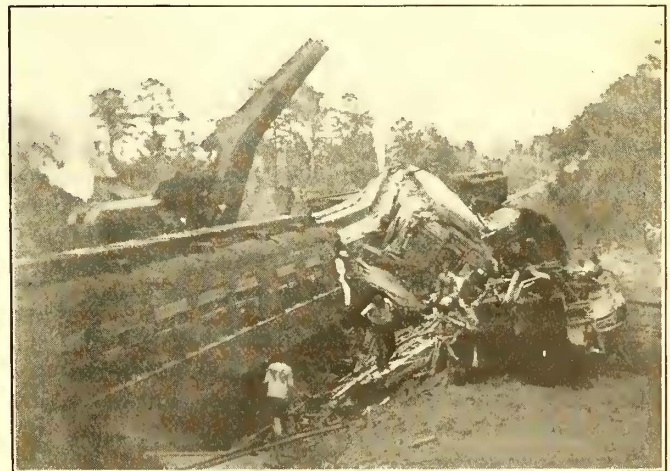
The loop is thus distended in such a manner that the vestibule end of an invading car will penetrate within the loop. The initial shock of collision will be met by the vestibule end posts. When the resistance of these end posts is overcome and as the invading body progresses, the cable loop, together with the members of the invaded vestibule, will be drawn in and down against the vestibule of the invading body, crushing both within the confines of the loop.

The more resistant the structures thus crushed, the greater will be the energy absorbed and the greater will be the pull exerted by the cable, through its anchorage in the underframe, to impart motion to the mass.

The design further provides for a second group of cables, imbedded in the body corner posts and body end frame, to act as a second line of defence against the invading car. Should the force of the collision be not completely dissipated through the resistance of the vestibule end posts and the cable in the vestibule end, the invading car body will next encounter the high

resistance of the body end wall, and the second group of cables will come into action upon being encountered by the invader. The second group of cables, being also anchored to the underframe and distended in loop form, will also draw the structure of the invaded car down and in upon the invader and similarly impart motion to the mass. This second group of cables will also act to draw downward and inward the roof and sides of the invader.

The arrangement of the cables is purposely such that it is impossible to bring an abrupt stress on them. They are distended in an approximately rectangular loop by members which, when subjected to collision shock, are bent and distorted by the cable which is of superior strength to any member with which it is associated except only the center sill to which it is anchored. For example, the combined tensile strength of the cable loops shown in the illustration is 2,000,000 lb., and therefore equivalent to the ultimate strength of center sills having a cross section of approximately 50 sq.in.



WHEN THE UNDERFRAME OF ONE CAR OVER-RIDES ITS NEIGHBOR THE UNDERFRAME ACTS AS A SHEAR AND SPLITS THE SUPERSTRUCTURE OF THE INVADDED CAR. THIS DERAILMENT OCCURRED AT A SPEED OF ABOUT 50 M.P.H.

Consequently when a car body protected by cables is invaded, the vestibule of the invader will be crushed down and the zone of destruction in the invaded car will be limited to the area inclosed by the cable loops engaged.

In an accompanying illustration the cable loops are shown in combination with our high girder side frame and body end reinforcement as first described. This we consider the strongest form of car body construction in use today. When completely equipped with cable loops, this design provides the following path of resistance to penetration by an invading body:

1. A rigid vestibule end wall having as high initial resistance as practicable.

2. Cable loop, inclosing the vestibule end wall and acting to retain the structural members in the path of the invading body, upon the failure of the initial resistance of the vestibule end wall.

3. A rigid body end wall including the strong piers at the doorway and the deep body end reinforcing plate, collectively more than five times the section of the vestibule end.

4. The second group of cables which will act to prevent disruption of the body end wall structure and any further penetration.

The resistance effected by the cable loops is cumulative and the ultimate resistance will not be reached until the wreckage of both vestibules is compressed in a tangled mass within the confines of the loops engaged. The crumpling of the structural members within the cable loops will act to cushion the shock. The resistance will increase rapidly in a series of steps beginning with the resistance afforded by the rigid vestibule end posts and reaching a peak equal to the accumulated resistance of the four stages in the path of resistance above described. The body end structure being of much greater strength than the vestibule end structure will insure that the vestibule structure must be practically destroyed before the initial resistance of the body end structure is overcome and the second group of cables called upon to resist further penetration. I believe that only in cases of the utmost violence will the body end of the invaded car be crushed in and the ultimate resistance of the main cable be developed.

DISCUSSION OF MR. BRINCKERHOFF'S PAPER

James E. Howard, engineer-physicist Interstate Commerce Commission, opened the discussion of Mr. Brinckerhoff's paper. He said that it appears entirely feasible to provide a vestibule construction of the type outlined which would aid in preventing destruction of the car superstructure and increase safety. He said that the best results would be accomplished by providing a flexible means to reduce disastrous effects of accidents at comparatively low speed, but he felt that at extremely high speed it would be almost impossible to prevent destruction. He expressed the belief that the dissipation of the effect of collisions should take place outside the confines of the car body and that the outer end and the vestibule should be given careful consideration. His understanding was that steel wire cable advocated by Mr. Brinckerhoff was not intended as a substitute but as an adjunct to the present type of construction. A great advantage of such cable is its flexibility which enables it to take short bends. Its greatest usefulness would be in transmitting shocks to some heavy members of the car structure.

James C. Hassett, mechanical engineer New York, New Haven & Hartford Railroad, dwelt on the advantages of reducing weight in car construction and felt that the type of construction as outlined should serve a useful purpose in this respect. He thought that any anti-telescopic device would depend for its effectiveness on its ability to be efficiently anchored to the substructure of the car.

L. B. Stillwell brought out two points which should be of particular interest to electric railway men. These were that this type of construction offers a field for the reducing of weight of car bodies and also that it provides an underframe which would be particularly adapted to the installation of electrical equipment.

Association News

Committee on Valuation Meets

THE initial conference of this year's American Association committee on valuation was held at association headquarters on March 19. Those present in addition to Chairman Martin Schreiber, Public Service Railway, were C. F. Elmes, Sanderson & Porter, New York; G. W. Gillespie, Associated Gas & Electric Companies, Ithaca, N. Y.; W. H. Maltbie, United Railways & Electric Company of Baltimore, and W. H. Sawyer, E. W. Clark & Company Management Association, Columbus, Ohio. Acting Secretary J. W. Welsh also attended the meeting.

Two subjects, both of which were suggested by last year's committee in their report, were up for discussion. One of these was on the uniform procedure of appraisals. The consensus of opinion of those present was that the forthcoming report should cover in detail as far as possible the economic procedure to be followed in making appraisals with the idea of pointing out what parts of the property should be most carefully inventoried due to the amount of investment involved. The other subject was the rate of return. It was planned that a discussion would be submitted by one of the committee members for analysis at the next meeting.

As this issue of the ELECTRIC RAILWAY JOURNAL goes to press the Engineering Association committees on equipment and building and structures are in session at association headquarters. Reports of their sessions will be given in a later issue of the paper.

In a recent issue of *Commerce Reports* is a statement about the necessity of modern transportation facilities in Harbin, a Chinese city of 300,000 population. It says that both Japanese and Russian companies attempted to obtain the contract for a street railway, but it was finally awarded to a Chinese concern. The specifications call for 8 miles of double track and 5 miles of single track, with an overhead trolley system. The Chinese company has undertaken to have a part of the line in operation four months after construction work has been started and to pay 30 per cent of the gross receipts to the municipality as soon as cars are running. It is unreasonable to suppose that receipts will exceed expenditures for several years after the completion of the tramway.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Sliding Scale Franchise

Committee of Engineers at Duluth Suggests This as an Incentive to Economical Management

After two months of work a committee of six Duluth engineers has drafted a service-at-cost franchise which it has submitted to the Civic Council of Duluth and to the Duluth Street Railway for consideration as a fair and reasonable solution of the city's railway problem.

The proposed franchise provides that the dividend return to the company shall vary inversely with the fare charged on the railway as an incentive to economical operation.

FRANCHISE SUBMITTED TO RAILWAY

A copy of the franchise has been placed in the hands of the Duluth Street Railway for comments and suggestions. The engineers will then consider all changes and in an amended form will resubmit the draft of the franchise to the Civic Council. After the franchise is finally amended to the satisfaction of the member bodies of the Civic Council, which include both business and labor organizations of the city, it will be presented to the City Council and will likely thereafter go to the people for a vote.

The outstanding feature of the franchise is that the city is permitted to retain broad rights of regulation over fares, service and improvements, while the company would be rewarded for good performance by being allowed increased dividends as the fares might decrease. The measure creates the office of supervisor of street railways in the city government and to take the place out of politics it is stipulated that the appointee to this office must be qualified with at least eight years experience in railway work, five of which must be in the capacity of an executive.

FIVE-CENT FARE POSSIBLE

The new franchise provides that dividends shall be paid only on the actual value of the company's property—a figure to be agreed upon later from computations covering a period of the last five years. The measure would therefore entail a recapitalization of the company to eliminate any possibility of "watered stock," which seems to be a bone of contention in the present street railway fare controversy.

The committee of engineers asserts that a preliminary valuation of the company's property has convinced it that by recapitalization the company can charge a 5-cent fare and still earn dividends of 8 per cent. As stated previously there would be a sliding scale

for fares and dividends, one going up as the other went down, or vice versa.

With reference to the amortization provision of the franchise it has been stated that the length of the grant is twenty-five years. The franchise provides that if at the end of ten years the city should decide to purchase it would only be necessary to raise the fare 1 cent, thereby creating a fund out of which the property could be purchased. At the end of fifteen years the property would automatically become the city's without bond issue or any further expense.

An arbitration provision in the franchise would make recourse to the courts a last resort for the settlement of railway problems. Rates of return, service and the question of the use of traction facilities would be taken before members of this arbitration board. The city charter of Duluth already provides for arbitration of labor disputes between the company and its employees and the franchise follows in line with the city charter.

The present franchise of the railway expires in 1931.

New York's Transit Relief Measure Before Governor

The Assembly of New York on March 22 passed the Governor's transit bill by a vote of ninety-one to fifty-six. The Senate had already passed the measure, which now will be sent to the Governor for final action. W. Ward Smith, secretary to the Governor, has announced that Mr. Miller will give a public hearing on the measure at noon on March 29.

Debate on the measure brought out fiery statements. Assemblyman Jesse of New York City, a Republican, declared the Legislature's action would bankrupt the party and that Democrats might be in the majority in the Assembly in the next Legislature.

All the Democratic Assemblymen and the Socialists voted against the proposed measure.

Assemblyman Reiburn, New York City, Democrat, started the seven-hour debate by asserting the bill to be the "most brazen and bold" ever introduced in the Legislature. In the course of his remarks he said:

The measure seeks to foist upon the people of New York City obsolete street cars and run-down railway equipment. It seeks to take away from the people any possibility that they might in the future earn a few per cent interest on the \$300,000,000 invested in their subways.

You Republicans are taking away the last vestige of home rule. You are attacking the faith of contracts, and the men who are putting this over will be in danger of the safety of their own property. You are committing the greatest crime against the people. You are taking their property away without due process of law.

Thompson's Plan Heard

Lively Hearing and Embarrassing Questions at Session on Chicago Traction Issue

As a result of a public hearing held before the Illinois State Legislature on March 15 it was announced that several important amendments would be offered in connection with the plan of Mayor Thompson for "people's ownership" of the Chicago Surface Lines and a 5-cent fare. It is understood that the Mayor of Chicago will agree to changes in his bill which will provide for a referendum vote prior to the granting of additional taxing powers for the purpose of paying a deficit in operating expenses; a referendum vote if the question should arise of absolute purchase of street railway property in the "transportation district"; provision for a lower fare than 5 cents if this becomes possible; referendum vote to decide whether the \$25,000,000 now in the "traction fund" should be turned over to the "district."

MAYOR HIS OWN SPOKESMAN

Mayor Thompson as well as Special Counsel Cleveland and Barrett spoke on behalf of the proposed legislation. They had to answer some embarrassing questions, and when Attorney Cleveland was asked why the present utilities commission, which is favorable to the city administration, did not take steps to establish a 5-cent fare at once he said:

As long as the present utilities act is on the statute books we must abide by it. Repeal the utilities act and we can start something.

The Mayor stated positively that the city could operate the surface lines at a 5-cent fare at a profit. Attorney Cleveland was asked why it is not intended to include the elevated lines in the plan, and he replied that inasmuch as these roads were organized under different laws and owned their right-of-way it would not be policy to attempt to put them into the initial plan.

Attorney Cleveland also expressed the opinion that the surface lines could at least have made operating expenses in the past year under a 5-cent fare. When he was asked if he thought it right to spend the taxpayers' money to pay any part of street car fares he said:

If the taxpayers can be forced to furnish the money to build boulevards for the rich who ride over them in automobiles it will be perhaps just as well for part of the taxes to be spent in a way that will give the great mass of the people some benefit.

One objection was that the bill creates a new taxing body while a great number of taxing bodies are already operating in Chicago. Further consideration of the bill was deferred.

Taxpayers Not Restrained

Suit by Fourteen Residents of Seattle in Municipal Railway Fight to Proceed to Regular Trial

In a decision handed down on March 13 Federal Judge Jeremiah Neterer denied the motion sought by the Puget Sound Power & Light Company, Seattle, Wash., for a temporary injunction to restrain the fourteen taxpayers suing the city in Superior Court from doing any act which might result in causing a breach of the \$15,000,000 railway contract, or default in payment of the interest on the bond issue. Judge Neterer held that there is no controlling force in the statement made by attorneys for the company that the state court is without jurisdiction, and should be enjoined from proceeding in the taxpayers' action.

Judge Neterer held that the taxpayers' action in the Superior Court is to protect the general fund of the city from invasion for the purpose of depleting the special fund for any purpose. The recourse of the plaintiff, he held, is clearly to maintain the integrity of the special fund.

The court refused to enjoin the state court in proceeding in this matter and held that it is presumed to have full jurisdiction. The taxpayers, Judge Neterer held, are not proceeding against the special fund, which is separate and distinct from the general fund. The temporary restraining order against the fourteen taxpayers, issued on Feb. 21 and continued on March 1, has accordingly been dismissed.

ANOTHER HEARING FIXED

Attorneys for the Puget Sound Power & Light Company, following Judge Neterer's decision, immediately filed a new motion in the U. S. court, asking again for a temporary injunction against the taxpayers. The new motion asks that a temporary injunction issue, restraining the taxpayers, and each of them "during the pendency of the above entitled cause from instituting any suit against the plaintiff or making the plaintiff a party to any suit which it is or shall be claimed, that any provisions of the bonds issued by the city of Seattle, under ordinance 39,025, are invalid, or that alleges or claims that the city of Seattle was not obligated, out of the gross revenues of the municipal street railway system to pay into the special fund, created by such ordinance, the principal and interest of such bonds as provided by such ordinance."

The new motion was set to be argued on March 21.

Boston "L" May Run Buses

The Boston (Mass.) Elevated Railway has petitioned for permission to own and operate motor vehicles which do not run on tracks or rails. The matter was brought to a head by a notice from the city of its intention to repave Market Street, Brighton. This would make necessary relaying of the

elevated's tracks on this street at an estimated cost of about \$85,000. Inasmuch as only 1,700 people use this line daily, the trustees of the road decided that the expense was prohibitive.

If the pending petition is granted, operation of electric cars on this 1½-mile line will be discontinued and instead two buses will be operated, whether 16 or 25 seaters has not yet been decided. Fare will be the same, with better headway.

It is said that from time to time, as it becomes necessary, to rebuild the tracks on poorly patronized lines the elevated may again have recourse to the jitney franchise, but at the present time the Market Street line is the only one where the change is considered necessary.

One-Man Car an Issue in Pennsylvania

R. H. Horton, traffic engineer of the Philadelphia Rapid Transit Company, appeared recently before a committee of the Pennsylvania House in opposition to a bill introduced in the Legislature making it unlawful to run or operate or permit to be run or operated any car on a street passenger railway with a crew consisting of less than two men.

He said that the bill would affect the Philadelphia Rapid Transit Company in three ways: (1) In the operation of safety cars; (2) in the operation of trains of surface cars; (3) in the operation of subways and elevated lines. He showed that all three of these methods of operation as at present conducted by the company are safe, economical and advantageous. In conclusion he said:

We realize that this committee is not so much interested in maintaining economical conditions for Public Utility Companies as in protecting the lives, interests and rights of the citizens, but I wish to point out that if this bill is enacted it will not make street railway transportation any safer, but these companies will be obliged to employ more men to do work which is not useful and we maintain that every man not doing useful work is a charge on the community and no less so than if he were in the Alms-house. Particularly is this so in this case because the laws of the State, enforceable through the Public Service Commission, limit the amount of return which a street railway may earn, but in limiting it state that these companies should earn a reasonable return upon a fair valuation of the property. That being the case it means that the citizens will pay the operating expenses of these companies and a reasonable return and it also means that every legitimate economy which can be made in those operating expenses will immediately reflect itself to the advantage of the citizens in that it means improved service or a smaller bill that they will have to pay.

I present for your consideration the fact that through advancing costs service has been removed from 1,596 miles of electric railway track in the United States during the past three years, and 931 miles of track of this has been junked. Upward of 5,700 one-man cars are in use and were it not for their proved safe, economical operation, many communities would be entirely deprived of transportation.

Street railways in Pennsylvania have not had an easy time through the period of the war or the reconstruction period following, and I believe that the Legislature very clearly sees that all legitimate economies which the railways can make should be encouraged and not condemned.

The Philadelphia Rapid Transit Company owns twenty-five safety cars which are all operated on what are known as the Darby, Media and Chester division.

Nominations Rejected

New Jersey Legislature Fails to Confirm Governor's Selections—New Names Advanced

New Jersey's Public Service Commission has most certainly become the plaything of politics. Within the state itself the various moves that have been made in connection with the commission are all well known, but they do point a moral elsewhere. One of the latest developments was the failure of the Legislature on March 20 to confirm as commissioners two of the three men previously nominated for places on the commission by Governor Edwards, a Democrat and a hold-over. Since then, however, another chapter has been added by the Senate confirming on March 21 the nominations of Judge Harry V. Osborne and former Judge John J. Treacy, Democrats.

SENATORS PLAY POLITICS

The men who had been rejected for appointment were James A. Hamill, Jersey City, former Congressman, and Joseph E. Hoff, Princeton. The refusal of the Republican majority in the Senate to confirm Mr. Hamill and Mr. Hoff was put upon the ground that the appointees were not men of affairs, possessing the qualifications needed by public utility commissioners. Intimations that political considerations, among them a desire to embarrass the administration, prompted the Senate action were resented by the Republican members of that body. It is, however, significant that in confirming the appointment of Harry Bacharach, former Mayor of Atlantic City, the Senators supported the only Republican nominated.

Last September the Governor removed the old commissioners from office on the charge of neglect or misconduct. This the commissioners resented. They questioned the right of the Governor in the courts. The Supreme Court upheld that official. Appeal was then taken to the Court of Errors and Appeals. That body likewise sustained the Governor. The board, however, continued to function as a regulative body until the Supreme Court decision affirming the "ouster" was rendered on Dec. 27. Since then there has been no regulative body acting. Meanwhile the Legislature passed a measure amending the utility act so as to curtail the power of the Governor in the future by making the removal of commissioners possible only through impeachment.

EMERGENCY LEGISLATION PENDING

Matters have been complicated still further by a provision in the utility law that changes in rates filed with the commission and not acted upon within three months shall go into effect automatically. In consequence of this clause the Public Service Railway will be in a position, if it so desires, to put into effect 10-cent fares throughout New Jersey on April 1. Emergency legislation is pending, however, which would meet the situation thus arising.

Municipal Ownership Urged

Author of New Orleans Bill Says Persons Interested in Preserving Private Ownership Have Forced Issue

Former Senator E. M. Stafford, delegate to the State Constitutional Convention from the eleventh ward of New Orleans, La., and sponsor for an ordinance intended to place the local railway system in the hands of the city, disclaims hostility to present security holders, but says the public has lost faith in eastern transportation "Greeks" bearing gifts.

SEES CITY OWNERSHIP ONLY SOLUTION

On the contrary, he says, as much as he was formerly opposed to public ownership, just so insistent is he now that with proper safeguards municipal ownership furnishes the only solution of the problem. He maintains that the railway itself has forced the hand of the municipality through the present broken down system of transportation, discredited and unable to finance itself to function properly. He contrasts the management of the old water-works company with the present management of the Sewerage & Water Board, and asks pointedly: "Who would want the old water-works system back again?"

He said in part:

In New Orleans the hand of the municipality is being forced. If private persons had run the railway system satisfactorily the subject would never have come up for discussion. In the railways matter public ownership is being forced by those who have loudly protested against such ownership.

On one hand we find a broken down system of transportation, discredited and unable to finance itself to function properly, and on the other hand we find a patient, suffering community which has to put up with a decrepit system, and to pay increased rates for inferior service.

Public ownership of this utility is the only solution for the tangled situation. Please bear in mind that public ownership is not a theory advanced by radicals, but is forced on the municipal authorities by the failure of private ownership. The problem of readjustment appears too large for local financial interests, and the public has lost faith in eastern transportation "Greeks" bearing gifts, whose management of a great public utility has caused the public to lose faith in public utility investments. The credit of the city seems to be the only solution. The people must have better service and at a reduced cost.

We remember how the old water-works company was managed. It gave us muddy river water and poor service and defied the people, just as the railway is now doing, until the state authorities took charge of the matter. Who would want the old water-works system back again? Surely public ownership of this utility has been a success.

As much as I was formerly opposed to publish ownership I am now convinced that with proper safeguards it is the only solution of the great problem that has been forced on the people of New Orleans for solution.

I am not determined on the passage of the ordinance without amendment. I realize that the time of the convention is short, and if the people are to obtain relief through its efforts the matter must be placed before it in time to secure the best thought of the members of the body.

SERVICE-AT-COST OPPOSED

The Building Trades Council of New Orleans has filed a protest with the Commission Council against the adoption of the cost-plus plan of operating recommended by the eastern representatives of the security holders of the New Orleans Railway & Light Company. This method had also been ap-

proved by the special masters in chancery, appointed by the judge of the Federal District Court, as one of the means of solving the railway problem. Commissioner Maloney, of the public utilities committee of the Commission Council, is himself rather lukewarm in his support of the cost-plus plan.

The citizens' advisory committee at New Orleans has asked the public to help straighten out the railway tangle. This appeal is made by and through Hugh McCloskey, chairman of the advisory committee and former president of the New Orleans Railway & Light Company.

Labor Surplus on Coast

There is a surplus of labor available for electric railways on the Pacific Coast. The Pacific Electric Railway, Los Angeles, has announced that it is on the point of refusing additional applications and the United Railroads, San Francisco, has ceased counting the number of applications received. As matters stand now the labor turnover is comparatively low and the morale is greatly improved. The United Railroads employed less than twenty men in the month of January.

A strike recently of union employees of the Great Western Power Company, called almost without warning, was promptly broken and after a few days the company was able to recruit more men than were needed.

Union labor, however, exerted a powerful influence at the California State Capitol. The King tax bill, referred to previously in the *ELECTRIC RAILWAY JOURNAL*, proposes an enormous increase in the taxation of large corporations, public utility corporations included; the proposed eight-hour law would increase the operating cost of the electric railways of the State by many millions of dollars annually and the anti-safety car law, well camouflaged but nevertheless purely a labor measure, would prohibit the operation of the 268 safety cars now in service in California. The King tax bill, while it did not originate with the union organizations, was supported by that element.

One in Fourteen Has an Auto

Western states have taken to the automobile much more rapidly than has the East and South, according to data secured by the Omaha Chamber of Commerce from the state departments handling automobile registrations in each State. There are now about 7,500,000 automobiles in the United States or an average of one for each 13.8 persons, according to the figures compiled. Trucks are included with pleasure cars because many states do not segregate the types of vehicles. California heads the list with one car for every 6.2 persons. Iowa ranks fourth with 7.9, New York thirty-fifth with 18.6 and Mississippi last with 41.1. Of the first 25 on the list, twelve are western states; the last 10 are practically all southern or southeastern states.

Power Matter a Problem

This and Wage Contract and Interurban Railway Operating Agreement Consume Attention at Toledo

While Toledo's bus regulatory measure lies slumbering in Council the officers of the Community Traction Company and Commissioner W. E. Cann have before them the matter of a power contract, new wage contracts, and the framing of interurban contracts.

POWER RATE CONSIDERED HIGH

The power contract, submitted by the Toledo Railways & Light Company and signed by officials of the Community Traction Company, has not been approved by the commissioner. He said he felt the rate was too high. The Rail-Light is asking 2.35 cents a kw.-hr.

This matter of the rate will be left entirely to Prof. H. E. Riggs of the University of Michigan, who has completed a survey of the local generating and distributing properties as a basis for a street lighting rate. The legal aspects of the contract have been passed upon by the city law director, who has picked what he considers a number of defects in the agreement.

Representatives of city and the company will sit down and iron out differences as soon as Mr. Riggs reports. If they cannot agree the Public Utilities Commission may be called in to establish a rate. In event they do not act the matter is submitted to arbitration.

The new wage contracts submitted to President Frank R. Coates, of the Community Traction Company, are practically identical with those of last year, which expire April 1. No increases in wages have been asked. The men are receiving 54 cents for first three months, 56 for additional six months, and 60 cents maximum at the present time. The company officials have not made any announcement concerning their attitude on the wages asked.

For the purpose of framing the contracts under which all the interurbans will operate in Toledo a committee has been named consisting of Commissioner W. E. Cann, representing the public; W. S. Roger, general traffic manager of the Detroit United Railway, representing the interurbans, and H. T. Ledbetter, representing the traction company, which owns the city lines. The ordinance provided for a ninety-day period for getting the contracts ready.

PASSAGE OF BUS ORDINANCE PUT OFF

The bus ordinance has been opposed by some union labor representatives but it is favored by the carmen's union. For three weeks now the vote on the ordinance requested by the Mayor, Commissioner and other city officials to regulate, bond, license, and determine routes for buses has been postponed from week to week. At each session Council has been beset with a lobby of bus owners.

Railway Plan Expounded

Assistant Manager of D. U. R. Speaks in Behalf of Detroit's Proposed Service-at-Cost Ordinance

E. J. Burdick, assistant general manager Detroit United Railway, on March 4 outlined before the Detroit Engineering Society the proposed service-at-cost ordinance which his company has prepared to submit to the voters of Detroit on April 4, through its initiative petition. He went into detail relative to the points wherein the service-at-cost plan differs from the cost-plus system, which has proved unsatisfactory in so many cases.

Preliminary to discussing the terms of the service-at-cost ordinance, Mr. Burdick gave figures which indicate the magnitude of the Detroit United system, and presented a brief résumé of the past dealings between the city and the company. The statement was made that the entire Detroit United system comprises about 1,000 miles and serves nearly one-third of the population of the state of Michigan.

Only the high points of the ordinance were touched upon by Mr. Burdick, with all references to politics strictly excluded. He explained that the thirty-year grant mentioned in the service-at-cost ordinance is not a franchise as the city has full control and right to purchase at the end of any year and the right to lease at the end of any year after the fifth year. The valuation of the property upon which the city, according to the ordinance, would guarantee a 6 per cent return is to be fixed by a board of arbitrators and cannot exceed the 1919 appraisal of \$31,500,000. On this same valuation the city is to set aside monthly a sum sufficient to provide 2 per cent per annum to be placed in the city's sinking fund and to be used at the discretion of the city.

After dwelling briefly on the principal features, Mr. Burdick invited questions from engineers present. Some interesting questions were raised regarding the provisions of the ordinance and were fully explained in turn. Mr. Burdick was emphatic in his statement that there is no "colored gentleman in the woodpile." The ordinance, he said, is an earnest attempt on the part of the Detroit United Railway to settle Detroit's street car question once and for all along fair lines.

New Utility Court Planned in Iowa

Another court to interpose between the Iowa public utilities and their constituents is provided for in the Springer bill which has been adopted in the House of Representatives. The bill proposes to create a court of public service composed of three district court judges appointed by the chief justice of the Supreme Court of the State to review upon appeal all disputes between cities and public utilities as to rates and service. It grants to every corporation which comes under its plan an

indeterminate permit to operate, terminable by the court of public service, whenever the court considers its continuance against public interest.

All light, power, gas and electric railways come under the provisions of the bill but telephone companies are excepted. An attempt to exempt Des Moines City Railway from the indeterminate franchise feature was defeated. If the bill should become a law both the Des Moines City Railway and the Des Moines Gas Company cases would probably come before the new court.

Electrification May Save Road

The Chamber of Commerce of Kansas City, Kan., has interested itself in a recent project to keep the Kansas City-Northwestern Railroad operating. The road has been in receiver's hands and the possibility of its being junked seemed very likely. A movement is now under way, however, to prevent this and to electrify the road, operating trains from the municipally owned electric light plant in Kansas City, Kan. L. H. Chapman, commissioner of water and lights in Kansas City, has stated that the city could afford to make a very low rate for power to bring about the electrification of the line. An engineering firm of Chicago agrees with Mr. Chapman that the project is a feasible one and that business men should not overlook so great an opportunity to continue the road in operation. Before anything tangible can be done funds must be raised to liquidate debts incident to the receivership.

Connecticut for a Square Deal

Results of a state-wide referendum by the Connecticut Chamber of Commerce indicate public opinion in Connecticut to be strongly in favor of legislation looking toward solution of the electric railway problem. This referendum follows a special report on electric railway conditions of the State compiled after nearly two years' work by a special committee consisting of Morgan B. Brainard, Hartford; Arthur L. Kimball, New Britain; R. W. Perkins, Norwich; Percy T. Litchfield, Bridgeport, and Arnold Turner, Danbury. The vote was overwhelmingly in favor of:

All common carriers engaged in similar business being similarly taxed.

Street railways being relieved of all paying requirements except the obligation to repair paving actually damaged by the companies.

Street railways being relieved of all bridge building and maintenance requirements except the obligation to install and maintain the rails, wires and accessories used exclusively by the companies.

Street railways having authority to operate motor buses in substitution for, or auxiliary to, existing lines, and to establish new bus lines, subject to jurisdiction of the Public Utilities Commission.

Street railways having authority to abandon non-paying lines, or parts of lines, with permission of the Public Utilities Commission, after hearing.

Municipal ownership only where it is impossible to induce private capital to operate a railway.

Fares being determined by the relative cost of operating the street railway lines within a municipality or group of municipalities so interrelated as to riding habits as to make up a railway system essentially distinct from other systems in the state.

Forcible Arbitration Sought

Another Hearing at Albany on Appeal of Men to Require Strike to Be Arbitrated

Supreme Court Justice Howard at Troy, N. Y., on March 19 heard the application by Albany and Troy strikers for a peremptory writ to force arbitration of the dispute between the United Traction Company and its employees. Attorneys for the company fired eleven legal broadsides at the petition of the strikers. Chief among the legal objections raised by the company to the application which sought to invoke section 275 of the laws of 1920, the so-called "arbitration law," compelling arbitration of a dispute between two parties to a contract, were these:

That the petitioners (the presidents of the two unions) are not employees of the United Traction Company.

That the petition does not show that all the members of the Albany and Troy unions are employees of the company.

That the statute law 275 does not authorize the petition nor authorize the petitioners to maintain the proceedings.

That the arbitration clause in the contract between the company and its employees specifically mentions employees, and not members of the unions.

RAILWAY ATTORNEY EXPLAINS

Attorney Norton for the company in further explanation said:

I want to call attention to section thirty-six, the arbitration section. Now this is not a general arbitration clause. It specifically sets forth that a month before the contract expires there shall be arbitration, which, if it is construed that the contract expires July 1 next, would mean it is too early for arbitration, or that if it expired Nov. 1 last, when the wage provision expired, it is too late for arbitration.

Our final objection is that the petition on the face does not show the existence of any provision in a written contract to settle by arbitration a controversy between the petitioners or their alleged unincorporated associations and this respondent. I want to call the attention of your honor to the fact that the word "employees" is used and not the members of the said incorporated associations.

When the attorneys for the United Traction Company had finished their arguments the attorneys for the strikers were forced to ask that the argument of the petition be continued to give them time to answer. An arrangement was finally suggested by Justice Howard whereby the hearing will be continued on March 26. In the meantime both sides will file briefs.

For the benefit of the Mayors of the five cities in which the company operated Vice-president Weatherwax has reviewed the strike situation in a letter to them, indicating the extent to which the municipalities will be held liable by the railway for damage sustained to its property. Paragraphs from the letter touching specifically on these matters are as follows:

We shall expect to be reimbursed for the destruction of our property, which has been substantial, and bills are in course of preparation and will be sent you in due course. It is unfortunate that the taxpayers must assume this burden. We cannot expect, however, to be reimbursed for the personal assaults and damages to our employees. Human rights in this particular case seem to be subordinate to property rights.

We believe that further and more effective measured should be taken to safeguard the rights of the public, our employees and our property, and hope that you can arrange to accomplish this at once.

Philadelphians Rejoice

Ten Years of Co-operation on P. R. T. Under Stotesbury-Mitten Management Celebrated by Banquet

E. T. Stotesbury and T. E. Mitten were tendered a testimonial banquet at the Hotel Lorraine on March 2 by the co-operative committees in celebration of the tenth anniversary of the successful operation of the co-operative plan on the lines of the Philadelphia Rapid Transit Company. Mr. Stotesbury was unable to be in attendance, due to his absence in Florida. The toastmaster was F. W. Johnson.

He said that only by looking back to March 2, 1910, was it possible to measure accurately the progress made since that time under the Stotesbury-Mitten management. John Lumbury, chairman of the employee committee of the transportation department, and other speakers from various branches of the service responded. They all reiterated the wonderful accomplishments under the present management.

THRIFT VALUE EXPLAINED

George W. Jackel, chairman of the general office department committee and president of the saving fund, told of the work done in inculcating thrift among the employees. Employees in the savings fund now number almost 8,000 members, with more than \$1,000,000 well invested and money being deposited at the rate of more than \$1,000,000 a year. This fund was started in 1919, when nearly everybody was spending madly and recklessly. In the face of this tendency of the times Mr. Mitten had pointed out to the employees the foolishness of such recklessness and had converted many employees into consistent savers.

George I. Zellers, another speaker, recited the difficulties overcome in winning the men to the Mitten plan after the ill will engendered previous to the coming of the Mitten management. He said that Mr. Mitten, however, had not only fulfilled his promises but had exceeded them. An engrossed volume containing the names of 10,214 employees of the company was presented to Mr. Mitten, and a similar volume was forwarded to Mr. Stotesbury.

Mr. Mitten was deeply moved. He said that the recent booklet showing the ten years of accomplishment under the Stotesbury-Mitten management, to which reference has been made before in the *ELECTRIC RAILWAY JOURNAL*, was put together at his suggestion for two reasons; first, so that the men might have before them a definite statement of the things that had been accomplished and in which they had had a part, and, second, because, knowing that Mr. Stotesbury had completed his term of work with the company, Mr. Mitten wanted to establish Mr. Stotesbury's work in the form of a monument to him.

He said that Mr. Stotesbury has already done for Philadelphia more than any other citizen could be asked or expected to do. He said that he was send-

ing a telegram in testimonial to Mr. Stotesbury that he was sure "will sweep out of his mind clearly and cleanly all the difficulties that have occurred during his connection with us and leave only the wonderful feeling of accomplishment, so that he may consider that this ten years of work has been one of the greatest, if not the noblest, acts of his whole career. At least I am sure, and I am more certain of it than ever from that rising vote and that unanimity with which you arose, that we all together give him in saying farewell our respect and the love of the whole organization."

BUILDING FOR PERMANENCE

Mr. Mitten said that the call had come repeatedly from other cities to show them the way. During the last two years he had developed an organization which was self-perpetuating. The working out of the plan which the Mitten interests have in mind went beyond one man's lifetime. He then referred somewhat at length to the plan of organization of the Mitten Management, Inc., with Messrs. Tulley, Dunbar, Richardson, Joyce and P. J. Mitten as vice-presidents.

Mr. Mitten said that while he expected to die in harness he was nevertheless sure that the work would go on without him when his time came. It was in discussing this and other matters that Mr. Mitten made the reference to his son, Dr. Mitten, which has been quoted previously in the *ELECTRIC RAILWAY JOURNAL*.

In the testimonial to Mr. Mitten signed by the employees this hope was expressed:

"May your principles and practices serve as a perpetual well-spring of inspiration to others, and may their benefits and benign influences be extended to workers throughout all the land."

News Notes

New Agreement Will Call for Wage Cut.—It is reported that within the next two or three days the New York State Railways will offer the men in Rochester, Syracuse, Utica and Rome a new contract calling for a cut in wages from 60 to perhaps 45 cents per hour. The agreement between the company and the men expires on May 1 and under one of its provisions proposals for a new agreement must be submitted before April 1.

Bus Must Not Compete With Railways.—Permission to operate a bus line between Springfield and Peoria has been granted the Peoria-Springfield Motor Transit Company by the Illinois Public Utilities Commission. The company is allowed to have stations in seven towns, not including the terminals

in Peoria and Springfield. The order of the commission prohibits the company from competing with any bus line now operating or with the electric railways in Peoria or Springfield.

"Ship by Trolley and Save the Highways."—The Indiana Service Corporation, Fort Wayne, Ind., has recently been doing some interesting advertising for the purpose of building up its freight business. This advertising has taken the form of "ads" three columns wide by 8 in. high. The only copy appearing in these advertisements has been this phrase: "Ship Your Freight By Trolley and Save the Highways."

Minnesota Measure Amended.—Eight amendments affecting the wording and intent of the substitute measure for the Brooks-Coleman bill providing for regulation of rates and securities issues of electric railway companies in Minnesota were adopted in the senate on March 10. A tenth amendment was rejected. Among the accepted amendments was one providing that only Minnesota corporations can receive indeterminate permits and franchises. Another designates the manner in which cities may acquire railway properties.

More Buses for San Francisco Municipal System.—A committee of citizens representing residents of the Twin Peaks district in San Francisco, Cal., have secured the approval of the Board of Supervisors for a bus line to serve this district and connect with municipal cars on the Market Street line. Two buses would be sufficient, according to the committee, to maintain the desirable service. The proposal is that the buses be put on as soon as the Market Street extension, a regrading project, is completed.

Municipal Men Still Seek Pay Increase.—Track and platform men of the San Francisco (Cal.) Municipal Railway have renewed their efforts before the Public Works Board to obtain a \$1 a day increase in pay, which would mean a \$6 a day wage. Failing to obtain the increase the men will appeal to the Board of Supervisors to meet the raise. The increase would effect more than 800 men. The Municipal Street Railway employees have been endeavoring for two years to obtain the \$1 a day increase in pay.

Hearing on Utility Bills in Pennsylvania.—The various bills amending the Public Service Company law of Pennsylvania came up at public hearing on March 15 before the House judiciary general committee, and because only a fractional part of the representatives of the municipalities and public utilities had an opportunity to discuss the bills the hearing was continued after a two-hour discussion until March 22. The committee confined the remarks to the Fitzgibbon bill, giving the Public Service Commission discretionary powers to suspend increased rates until final action is taken by the commission and the McVicar bill, which requires that the utilities file data showing why increases are desired when making application for higher rates.

Financial and Corporate

New Cincinnati Directors

Indications Point to Early Consummation of Changes Suggested by Street Railway Director

Developments in the railway situation at Cincinnati, Ohio, during the past week included announcement of the appointment of two new directors of the Cincinnati Street Railway and the naming of a stockholders' committee among certain interests in Cincinnati Street Railway stock.

Charles W. Dupuis, president of the Citizens' National Bank, and Attorney Robert A. Taft, son of the former President of the United States, William Howard Taft, are the new members on the Cincinnati Street Railway board. Mr. Dupuis succeeds Stephen R. Burton and Mr. Taft succeeds Edward Goepfer. It is understood that Mr. Taft represents the Taft and Mr. Dupuis the Kilgour interests on the board, adding thus to the influence of those two sets of interests in the directorate.

The personnel of the committee of stockholders includes Charles P. Taft, William Worthington, Edward Colston, Robert A. Taft, Edward W. Strong, Samuel Assur, Rufus B. Smith and Charles F. Windisch. Two of the members, Charles P. Taft and Robert A. Taft, are members of the directorate.

In connection with the announcement of the formation of the committee it was stated that the committee was appointed for the purpose of considering the problems arising out of the present situation. Just what relation it will have with the board or with the stockholders in general was not outlined. No intention to seek proxies or to represent other interests among the

stockholders was indicated. The committee is considered to be strongly representative of the Taft interests.

The present situation continues to be the subject of daily conferences and consultation among the various interests. The conference committees of the Cincinnati Street Railway and the Ohio Traction Company held a meeting last week in an effort to reach an understanding as to the proposed reorganization of the two companies as demanded by William C. Culkins, Street Railway Director. At the conclusion of the meeting announcement was made that more time was needed to discuss the different phases and that a report of the committee's decision would be made when an agreement was reached. In the financial district it is believed that a practical plan for financing the system will be devised and submitted to the directorate and stockholders as a result of the conferences.

Mr. Culkins said that while he was not aware of the purpose for which the stockholders' committee had been formed he considered it to be in line with his recent request that steps be taken by the Union Traction Company, the Cincinnati Street Railway and the Ohio Traction Company to reorganize into an operating company.

The object of the reorganization, as proposed by Mr. Culkins, was to bring about a reduction of fares. He called upon the three companies to reduce their capitalization, settle certain demands which are said to be outstanding against the companies to the extent of \$300,000 or \$400,000, and to surrender the franchises under which they are now operating.

Another conference of the committees has been called for March 28.

Bids for Railway Sale Authorized

Justice George W. Cole in the Supreme Court of Erie County has issued an order authorizing William B. Cutter, as receiver, to advertise for bids for the sale of the property of the Buffalo & Depew Railway, Buffalo. The bids will be for all or any part of the equipment of the interurban line between the Buffalo city line and the village of Lancaster. It includes machinery, rails, ties, bridge, carhouses, power house and all other property real and personal including franchises. Bids may be made upon the understanding that the successful bidder shall have the right to operate or junk the property.

A partial list of the property shows 1,315 gross tons of steel rails; 121 gross tons of miscellaneous iron; 2,894 lb. of copper bands and ears; 12 miles of 00 trolley wire weighing about 25,464 lb.; approximately 12 miles of 350,000 CM feed wire weighing about 67,668 lb.; feeder taps and cross bonds weighing about 1,000 lb.; 27,000 railway ties; 90,000 ft. of bridge timber; four two-motor passenger cars; one four-motor work car and plow; one three-motor sweeper; and office furniture and fixtures.

Subway Alone Earned Charges

According to a statistical statement recently issued by the New York Public Service Commission, First District, all the railways in the Borough of Manhattan except the Subway Division of the Interborough Rapid Transit Company failed to earn fixed charges for the six months ended Dec. 30, 1920.

Two of the three companies divorced from the New York Railways combine failed even to meet operating expenses, while the third—the traction lines of the New York & Harlem Railroad—failed to meet its fixed charges.

The Third Avenue Railroad, including its subsidiary Westchester lines, earned its fixed charges except for full interest on its adjustment income bonds. A statistical study follows:

INCOME ACCOUNT — TRANSPORTATION SYSTEMS IN MANHATTAN AND THE BRONX
Six Months Ending Dec. 30, 1920

	—Interborough Rapid Transit Co.—							New York & Harlem Traction Line	Third Avenue Railroad
	Total	Subway Division	Manhattan Division	New York Railways	Eighth Avenue Railroad	Ninth Avenue Railroad	Second Avenue Railroad	(a)	(d)
Passenger revenue.....	(c)	(c)	(c)	\$4,287,384	\$561,607	\$247,779	\$476,136	\$808,810	\$6,565,646
Other revenue.....	(c)	(c)	(c)	512,053	10,625	5,000	28,208	13,153	176,313
Total operating revenue.....	\$26,969,396	\$16,806,448	\$10,162,947	\$4,799,437	\$572,232	\$252,779	\$504,344	\$821,963	\$6,741,959
Operating expenses.....	18,034,299	10,764,966	7,269,333	4,613,994	619,317	300,941	479,498	764,004	5,464,491
Operating revenue.....	\$8,935,097	\$6,041,482	\$2,893,614	\$185,443	\$36,985	\$48,162	\$24,846	\$57,959	\$1,277,468
Taxes.....	1,311,268	210,679	1,100,588	393,653	45,117	27,031	45,985	30,000	316,291
Operating income.....	\$7,623,829	\$5,830,803	\$1,793,026	\$208,210	\$92,202	\$75,193	\$21,139	\$27,959	\$961,177
Miscellaneous income.....	316,253	(c)	290,790	293,155	17,415	1,875	922	257	.....
Gross income.....	\$7,940,082	\$6,121,593	\$1,818,469	\$84,945	\$74,787	\$73,318	\$20,217	\$28,216	\$961,177
Fixed charges.....	10,622,342	5,939,602	4,683,239	1,402,725	37,706	3,904	94,835	108,550	771,721
Net income.....	\$2,682,260	\$181,989	\$2,804,749	\$1,317,780	\$112,493	\$76,222	\$115,052	\$80,334 (a)	\$189,473
Revenue passengers.....	496,595,522	308,285,537	188,309,985	83,298,107	11,232,143	4,973,305	9,852,902	16,176,205	133,883,595
Revenue transfer passengers.....	.....	.....	.....	6,453,797	.....	.....	.....	.....	.....
Free transfer passengers.....	.....	.....	.....	2,034,057	.....	11,939	251,553	1,638,856	27,529,721
Total.....	496,595,522	308,285,537	188,309,985	91,785,961	11,232,143	4,985,244	10,104,455	17,815,061	161,413,340
Miles of track.....	348.62	223.48	125.14	(c)	(c)	(c)	(c)	(c)	(c)
Active passenger car-miles.....	85,922,894	50,986,431	34,936,463	6,953,625	1,366,785	802,871	919,287	1,609,980	11,283,069
Passenger car-hours.....	(c)	(c)	(c)	1,047,519	189,820	104,941	132,663	213,321	1,440,189
Car-seat-miles — active.....	(c)	(c)	(c)	296,986,222	43,737,088	28,903,356	42,044,627	66,742,190	514,114,700

Note.—Figures in italics indicate deficit.
(a) Applicable to adjustment bonds — with interest charges of \$563,399.
(b) Includes other operations (c) Details not available.
(d) Financial figures include and traffic figures exclude Westchester companies operating no cars in New York City.

\$58,100 Deficit in Toledo

Showing for First Month Under Service at Cost Regarded as Far From Disappointing

Operations for the month of February, 1921, of the Community Traction Company, Toledo, Ohio, showed a deficit of \$58,176, according to Commissioner Wilfred E. Cann, in his first monthly report to the Board of Control. In commenting on the report, Mr. Cann said:

In view of the fact that a relatively low rate of fare, as compared with last year, became effective on Feb. 1; that industrial conditions in the city are in a stagnant condition; that we have not as yet had time to put into effect economies which may result in the rerouting of cars, I think you will agree that the showing made is far from disappointing, and I can safely assure you that despite the decrease in revenue for the first seven days of March over the first seven days of February this month's report will show a greatly improved condition.

The table gives details of operation for February, 1921.

The Community Traction Company has rented for office space the entire fourth floor of the Toledo Railways & Light Company building for \$1,650 per month. The tax reserve set up for February is practically double what it would be ordinarily, due to the company being compelled by ordinance to have its fiscal year agree with the calendar year. The monthly tax reserve will approximate \$7,750 hereafter.

The monthly credit to the depreciation fund has been fixed at the minimum allowed by the ordinance; namely, 0.5 per cent of the capital value. This amounted to \$3,541 for the month. An allowance of 8 cents per revenue car mile is being made temporarily to the maintenance and repair fund. Undoubtedly this is insufficient to cover the necessary work for during the month of February the work undertaken cost \$360 more than the allowance.

The city has through the operation of the sinking fund gained an equity in the company for the month's operation equivalent to \$17,708. The interest on bonds and dividends on preferred stock was paid to a trustee to be held for the city until the company lifts the mortgage on the railway property.

The Toledo Railways & Light Company asked for a rate of 2.35 cents a kilowatt for power under a 25-year contract, compared to a rate of 2.28 cents per kilowatt as was formerly charged off to the railway department by the old Rail-Light company. Commissioner Cann states that the ordinance provides that the rate for power shall be a "reasonable charge based upon cost of generating power in a modern power plant," and that he has submitted the contract to Professor H. E. Riggs, University of Michigan, for comment.

Results Better in Kansas City

Improved Efficiency With Reduced Personnel Contribute to Improvement There

Several items in the statistics of the Kansas City (Mo.) Railways indicate steady and marked progress during the past year and under the receivership, which has been in operation since September. During January, 1921, 15,431,572 passengers were carried, against 13,763,136 in January, 1920, including transfers, employees, and persons riding on passes. The figures for fares are for 1921, 10,425,502; and for 1920, 9,840,291.

The passenger revenue was \$783,606 in January, 1921, against \$725,021.10 in January, 1920. Costs have declined as receipts increased, despite the fact that larger amounts have been expended on maintenance and improvements. In January, 1920, for instance, \$23,892 was spent on ways and structures, and \$42,146 on this department in January, 1921. In January, 1920, power costs were \$241,827 and in January, 1921, \$210,155 although more cars were operated and more passengers carried.

FEWER EMPLOYEES

The reduced operating costs are reflected in the fact that in January, 1920, there were 3,900 employees, and in January, 1921, only 3,500 employees. In June, 1920, a voluntary wage increase was granted, amounting to about \$500,000 a year on the basis of the number of employees then serving. Still labor costs in January, 1921, were \$453,911, as against \$466,000 in January, 1920. The increase in wages has therefore more than been offset in improved efficiency, permitting reduced personnel and less overtime.

One of the most interesting subjects of comparison is that of accidents and claims settled. There was an average of thirty-one accidents a day in January, 1920; and an average of twenty-two a day in January, 1921. The total number of accidents in January, 1920, was 957; while the total this year was 712.

The receivers have been setting aside \$60,000 a month for claims; they have been settling every case immediately upon its arising, when possible—settling many more cases than the company had previously been able to dispose of proportionately to claims, and have accumulated a sum more than ample to meet the maximum demands, it is said, of pending liabilities.

Portland Notes Quickly Sold to Local Investors

Employees, customers and other individual investors not only absorbed the entire offering of \$1,000,000 of 8 per cent five-year gold notes of the Portland Railway, Light & Power Company, Portland, Ore., in twelve days, but also piled up an over-subscription in the same period. The achievement is believed to be a record for the sale of local securities in the Portland district.

STATEMENT OF INCOME, ACCRUAL AND OPERATING EXPENSES OF THE COMMUNITY TRACTION COMPANY, TOLEDO, OHIO

	Feb. 1920	Per Cent of Gross Revenue	Per Car Mile (Cents)
Passenger revenue.....	\$270,551	95.78	.....
Special car operation.....	16	.....	.....
Revenue from transportation.....	\$270,567	95.78	46.47
Station and car privileges.....	1,543	.....	55
Rent of tracks and terminals.....	9,632	3.42	.....
Rent of equipment.....	694	.....	25
Miscellaneous.....	50	.....	.....
Non-transportation revenue.....	\$11,919	4.22	.....
Gross revenue.....	\$282,486	100.00	46.50
Cost of operation:			
Way and structures.....	21,754	7.69	3.575
Equipment.....	23,137	8.17	3.800
Overhead system.....	4,102	1.45	.674
Transportation.....	132,887	47.00	21.820
Traffic.....	6	.....	.....
Power.....	57,447	20.38	9.440
General and miscellaneous.....	20,494	7.25	3.368
Expense of Street Railway Commissioner's office.....	742	.26	.122
Operating expenses.....	\$260,569	92.20	42.86
Gross income.....	\$21,917	7.80	3.64
Depreciation fund (a).....	\$3,542	.....	.....
Maintenance and repair fund (b).....	360	.....	.....
Sinking fund.....	17,708	.....	.....
Taxes (c).....	15,150	.....	.....
Interest on bonds (c).....	40,000	.....	.....
Dividend on preferred stock (d).....	3,333	.....	.....
Total deductions.....	\$80,093	.....	13.15
Net income from all sources.....	\$58,176	.....	9.51
Stabilizing fund balance Mar. 1 1921.....	\$341,824	.....	.....
		Per Cent of Total	Per Car Mile
Revenue Passengers:			
Full fares at 6 cents.....	4,241,928	77.60	6.97
Children's fares at 1 cent.....	298,171	5.46	.49
Total revenue passengers.....	4,540,099	.....	.....
Transfers at 1 cent.....	851,344	15.60	1.40
Employees.....	75,849	1.39	.12
Total riders.....	5,467,292	100.00	8.98
Revenue per fare passenger (cents).....	5.77	.....	.....
Revenue per revenue ride (cents).....	5.02	.....	.....
Revenue per ride (cents).....	4.95	.....	.....
Cost of operation per revenue ride (cents).....	4.83	.....	.....
Cost of operation per ride (cents).....	4.77	.....	.....
Revenue car miles.....	607,909	.....	.....

(a) Based on 0.5 per cent of capital value of \$10,000,000.
 (b) An allowance of 8 cents per revenue car mile credited to this fund. This figure represents over draft in fund
 (c) \$8,000,000 — 6% 1st Mortgage bonds outstanding.
 (d) Preferred stock outstanding is \$2,000,000 on 8 per cent basis.
 (e) Two months charges due to ordinance requirements.

The average daily sales during the campaign aggregated over \$90,000 and the total number of persons who purchased the gold notes is approximately 3,200.

The loyalty to and confidence in the company were displayed by the employees, nearly 70 per cent of whom bought a total of almost \$400,000 of the notes.

Of the entire offering 90 per cent was disposed of in the immediate Portland district, the balance being scattered over the thirty odd communities receiving light, power and transportation service from the company.

One of the gratifying features of the campaign was the fact that nearly 70 per cent of the total sales were cash subscriptions and the wide distribution of the sales is shown by the fact that the largest individual order was for \$7,500.

Results in Spokane Still Unsatisfactory

While the Washington Water Power Company's railway lines in Spokane were making a net profit of \$78,970 during 1920 with the 6-cent fare, the traction lines of the Spokane & Eastern Railway & Power Company were losing a total of \$144,029, according to the monthly reports submitted to the commissioner of public utilities.

The Washington Water Power Company was able also to set aside \$174,600 from the year's receipts for depreciation. The Traction lines, operating at a loss, subtracted \$14,649 for depreciation of property during the year.

Both companies are applying for an 8-cent fare.

The Water Power lines carried 20,500,075 passengers during 1920, while the Traction lines carried 9,274,743 passengers. The Water Power company made a profit of about one-third of a cent on each passenger. The Traction lines lost about one and one-third of a cent a passenger.

Heads of the two companies declare with equal emphasis that the 6-cent fare, in effect since April, 1919, has not solved their financial troubles.

Municipal Operation at Ten-Cent Fare Successful

The city officials of Ocean City, N. J., will apply to Chancellor Walker for the appointment of a trustee or receiver to operate the Ocean City Electric Railway during the coming summer season. The road has been operated during the past two seasons by a trustee appointed by the court. This was brought about by the company refusing to operate, after which the municipality petitioned the Board of Public Utility Commissioners to compel it to do so. The court then appointed a trustee and the municipality agreed to guarantee the cost of operation.

In the beginning the municipality guaranteed the cost of operation and maintenance only, any revenue over and above that amount to go to the bondholders. The first season there was very little left to divide among the

security holders. The railway was finally allowed to increase the fare to 10 cents in each zone and last season the corporation earned and paid 6 per cent on the bonds, over and above operating expenses.

The permanent and summer residents of Ocean City agreed to the 10-cent fare in order that the road be kept in operation. The railway is the only one in New Jersey being operated by a municipality.

Financial News Notes

Will Abandon Belt Line.—The Public Service Commission has granted permission to the Belt Line Railway Corporation to discontinue service on its line on Tenth Avenue between Forty-second Street and Battery Place, New York. Business on the line has been steadily decreasing. The rails are to be removed by the company and the street repaved.

Dividend on Arrears Declared.—The directors of West Penn Traction & Water Power Company Pittsburgh, Pa., have declared the usual quarterly dividend of 1½ per cent on the preferred stock, payable May 16, 1921, to stockholders of record May 2. The board also declared a dividend of 1¼ per cent on account of dividends in arrears accumulated upon its preferred stock prior to 1917, such dividend to be payable May 16 to stockholders of record May 2, 1921.

Brooklyn Receiver Would Resume Operation.—Lindley M. Garrison, receiver of the Brooklyn (N.Y.) Rapid Transit Company, has asked the Public Service Commission for permission to resume operation of the Park Slope line. Mr. Garrison intends, he says, to operate from Borough Hall to Park Circle during the morning and evening rush hours only. There will be no operation of the line on Sundays or holidays. The Public Service Commission has reserved decision.

Board of American Railways Increased.—At the annual meeting of the American Railways, Philadelphia, Pa., on March 17 the board of directors was increased from nine to twelve members. The new members are Charles F. Conn, James E. Gorman and Charles L. S. Tingley. The other members of the board are: Van Horn Ely, Lewis L. Dunham, John Gribbel, John J. Henderson, W. H. Lippincott, E. Clarence Miller, Charles R. Miller, Alexander C. Robinson and Thomas W. Wilson.

Valuation Being Made at Lynchburg.—The Lynchburg Traction & Light Company, Lynchburg, Va., recently made a valuation of its combined properties to be used as the basis of rate application. In order to confirm these figures the company is now having an

independent valuation made by A. L. Drum & Company, Chicago. As soon as this work has been completed and the report submitted, the company expects to file its formal rate appeal, basing the increase asked on the need shown by each separate department of the service as disclosed by the appraisal.

Messrs. Stotesbury and Shelmerdine Out of P. R. T.—G. A. Richardson, vice-president of the Philadelphia (Pa.) Rapid Transit Company in charge of transportation, and Charles J. Matthews, president of C. J. Matthews & Company, leather manufacturers, Philadelphia, have been elected to the directorate to replace E. T. Stotesbury and W. H. Shelmerdine. The other directors re-elected by the Philadelphia Rapid Transit Company are Thomas E. Mitten, W. J. Montgomery, W. Y. Tripple, Frank Buck, W. C. Dunbar, and Jeremiah J. Sullivan.

City Restrained in Valuation Case.—Federal Judge C. W. Sessions at Memphis, Tenn., has granted an injunction restraining the city from collecting on more than 75 per cent of the total assessment against the Memphis Street Railway and other utilities. He held that the property of the utilities had been assessed on a 100 per cent valuation, while the appraisal of other real estate property was on a much lower basis. The complainants had already paid their taxes on a 70 per cent assessment basis. The new order by Judge Sessions means that they must now pay an additional 5 per cent. The Memphis Street Railway contended that it was operating on a service-at-cost basis, and that during the last six months the loss was \$110,000. The opinion handed down by the court said that if the receivers were compelled to pay the disputed tax, which amounts to \$71,250 the company would have to raise the rate of fare from 6 cents to 7 cents.

Another Bondholders' Committee in Brooklyn.—A protective committee of three has been formed by holders of Brooklyn, Bath & West End Railroad general mortgage 5s, dated Oct. 1, 1933, following a report of the Bank of America, trustee, on the application of the receiver of the Nassau Electric Railroad, Brooklyn, N. Y., to discontinue operation of the lines of the West End Company. The Brooklyn, Bath & West End is a predecessor company of the Nassau Electric Railroad. There are outstanding \$121,000 of the general mortgage bonds which constitute a prior lien on property of the Nassau Electric Railroad. Retirement of the issue at maturity is provided for in the indenture securing the outstanding Nassau Electric first consolidated 4s, but since the institution of foreclosure proceedings on the Nassau mortgage, and the proposal of the receiver to discontinue operation on the West End line tracks, the formation of the committee was thought advisable by the trustee in order that the bondholders might be in a position to take concerted action as occasion might arise.

Traffic and Transportation

Louisville Appeal Heard

City Advances Contract Claim in Fare Controversy—Railway Contends City's Rights Are Regulatory

The appeal of the city of Louisville was heard by the United States Court of Appeals at Cincinnati, Ohio, on March 18 and 19. The case was carried to that court from the decision of Judge Walter Evans of the United States District Court of Louisville in connection with the injunction granted the Louisville Railway preventing the city of Louisville from interfering in the collection of a 7-cent fare. After hearing the appeal the court at Louisville adjourned until April 5.

The Court of Appeals did, however, order that in the interim the Louisville Railway issue receipts in the form of a stub on each strip of five tickets sold for 35 cents, this receipt to be held by passengers as a possible rebate voucher in the event the decision goes against the company. The company contended that to issue cash receipts with every fare collected would require a great deal of additional work and be very costly, but it indicated a willingness to co-operate by attaching rebate stubs to tickets.

The court further ordered that the company should give bond of \$200,000 to secure receipt holders. In the event the company loses the suit the federal court will appoint a commissioner to supervise settling the receipt matters. The railway has ten days under the court order in which to arrange for issuing receipts, but the company reported that it would have receipts out within two or three days.

Six-Cent Fare Paid Voluntarily

The spectacle of car riders voluntarily paying a higher rate of fare than is called for in a franchise possessed by their city is being witnessed in Lakewood, Ohio, a suburb of Cleveland with a population of 41,000.

Lakewood has a franchise with the Cleveland Railway calling for a straight 5-cent fare or eleven tickets for 50 cents. This franchise is still in effect, but recently, under the service-at-cost franchise in Cleveland, it became necessary for the company to charge a 6-cent fare within the limits of Cleveland. Then for a month or more, Lakewood car riders enjoyed a longer haul for 5 cents than Cleveland riders were getting for 6 cents.

City officials of Lakewood said they would not stand for boosting the fare for Lakewood riders to that being paid by Cleveland riders, but the company announced a 6-cent fare for Lakewood riders, effective on Feb. 27, and since that time more than 95 per cent of

Lakewood riders have been voluntarily paying the higher rate of fare. Officials of the suburb still say they will not formally sanction the increase and Fielder Sanders, City Street Railway Commissioner, admits that the company has no legal way of enforcing a rate of fare higher than a nickel.

Commodious Quarters for Bus Patrons

The city of Tacoma, Wash., will soon have one of the most convenient union bus stations on the Pacific coast. With this end in view the work of remodeling the building at Pacific Avenue and Eighth Street is now being completed. Motor buses for Olympia, Seattle, Puyallup, Sumner and other towns will load and unload their passengers there from an inside platform connecting with the ticket offices. Commodious waiting rooms will face the ticket offices. A restaurant and small shops will be located in the building. The bus station will be open to any bus company which wants to operate from it. The motorbus business in Tacoma has developed so rapidly during the last year that the move to make a union bus station in a central location became necessary.

State Seeks Control Over Interurban Fares

Recent advances in interurban fares in Texas have resulted in the State Attorney General being asked for an opinion as to the authority of the Railroad Commission over interurban lines. That official held that under the present state laws, the commission has no authority whatever over such fares. A bill has since been introduced in the House to give the Railroad Commission authority to regulate interurban fares.

Before this bill was introduced the commission called on the interurban companies for data and reasons for advances. Among the replies received was one from G. H. Clifford, vice-president and general manager of the Northern Texas Traction Company, Fort Worth. He stated the case for the interurbans succinctly. In concluding his remarks Mr. Clifford said that the situation affecting the interurbans was very different from that which existed some months ago. Service had to be provided now at greatly added operating costs. Moreover, there was no prospect of an early decrease in operating expenses. Traffic had decreased as a result of the abandonment of army cantonments, lessened activity in the oil industry and the general depression in business. He said that an analysis would show that even at the increased rates now in effect his company was not being compensated for service rendered.

One-Man Car Precautions

Massachusetts Commission Restricts One-Man Car Operation at Railroad Grade Crossings

The Massachusetts Department of Public Utilities has issued a drastic order governing the operation of one-man cars over steam railroad grade crossings. It is of especial interest to Massachusetts companies at this time, as the State Legislature has before it a bill sponsored by the labor interests to prohibit the operation of any one-man cars in the State because of the alleged danger to the public.

The grade crossing order of the Department of Public Utilities prohibits the operation of one-man cars across railroad grade crossings except where the crossing is protected by train crews, gateman or flagman, unless special authority is granted by the department. A safety stop is required at a distance of 75 to 125 ft. from the crossing, and another at a point just clear of the crossing. Installation of trolley guards is made compulsory.

The complete text of the order follows:

1. Unless authorized by the department, street railway cars operated by, or in charge of, one man shall not be operated over a railroad crossing at grade unless all engine and train movements over such crossings are required by the rules of the railroad, or by an order of the department, to be protected by train crews, or unless at the time the street railway car is operated over it such crossing is required by the rules of the railroad, or by an order of the Department, to be protected by a gateman or flagman.

2. Upon approaching a railroad crossing at grade the operator of a street railway car, operated by one man, shall bring it to a stop at not less than 75 and not more than 125 ft. from the crossing, for the purpose of making sure that the car is under control; then slowly advance the car to a point clear of the railroad track, where he shall again stop the car and ascertain if the way is clear before crossing; provided, however, that the second stop shall not be required at crossings of spur tracks where the rules of the railroad, or an order of the department, require all engine and train movements to be protected by train crews.

3. At all crossings with railroads at grade, except crossings where all engine and train movements are required by the rules of the railroad, or by an order of the Department, to be protected by train crews, there shall be maintained a trolley guard over the trolley wire constructed in such manner as to be connected with the power circuit, so that, in the event of the trolley wheel leaving the wire and being caught by the guard, power will be supplied to the car motors.

4. The foregoing rules shall not be considered as relieving street railway companies from maintaining special crossing protection required by specific orders issued by the department under the provisions of section 58 of chapter 159 of the General Laws.

5. The foregoing rules, with the exception of rule 3, shall be effective from and after April 1, 1921, and rule 3 from and after July 1, 1921.

Jitneys Ruled Off Railway Streets

The City Council of Kansas City, Mo., passed an ordinance on March 21 prohibiting the operation of jitneys on streets where electric railways now operate. The Mayor signed the order on March 22. A fund is being raised by the Jitney Owners' Association to contest the ordinance. The jitneys now operate over routes designated by the City Jitney Inspector. New routes must now be assigned away from car lines.

Eight Cents Asked in Spokane

A public hearing on the request for an increase in fares on the lines of the Washington Water Power Company and the Spokane Traction Company will be held in Spokane, Wash., by the State Public Service Commission the latter part of March or early in April. An 8-cent fare is sought. The present fare is 6 cents.

The Washington Water Power Company, in paving the way for the hearing, is using full page newspaper advertisements to tell the public the reasons underlying the request for increased fares. The initial advertisement was concluded as follows:

The history of the street railways in Spokane is an open book. Not a shadow of suspicion has ever been cast upon the granting of the franchises. Not a hint has ever been heard of sharp practice in the organization of our company. Not a dollar of watered securities figures in our capitalization. Not a cent has been filched from any one under the guise of reorganization, or otherwise. Not a word of doubt has ever been uttered as to the integrity of public officials in relation to the street railways. Differences of opinion, it is true, have been expressed heretofore as to the justice or wisdom of certain requests. Such differences of opinion as may arise in the settling of the question at issue can be approached without rancor—on a plain, square business basis—free from animosity, and with the public taken into confidence as to every detail.

It is with this spirit that we shall endeavor to show you as a citizen and property owner—whether you ride upon the street cars daily or very seldom—that an increased fare is not only just, but necessary. And in support of our contention we shall present to you, in simple form, a statement of our operating expenses and our income. We shall show what becomes of the fare that you pay us. We shall show you what other northwestern cities have done. We shall show you, in a word, how your own interests will be best advanced by the establishment of an 8-cent fare in the city of Spokane.

Ithacans to Pay Eight Cents

The Ithaca (N. Y.) Traction Corporation has been granted permission to increase its fares in all municipalities in which it operates from 7 cents to 8 cents. Some time ago the company applied to the Public Service Commission for authority to charge 10 cents, submitting statements to prove that the 7-cent fare was insufficient to yield reasonable compensation for the service rendered. There was a good deal of opposition to the advance in fares. Commissioner Irvine in announcing the decision stated that a 10-cent fare was not necessarily the solution to the traction problem, and that only what was imperatively required would be granted the company. In making a decision Mr. Irvine said that the patrons' welfare had to be considered. The recent ruling gives the company permission to charge an 8-cent fare on all lines in Ithaca, Cayuga Heights and the town of Ithaca with the exception of the East Ithaca line.

Courtesy Promotes New Business

Every official of the railroad department of the Monongahela Valley Traction Company, as well as heads of other departments of the same big local concern were present at a dinner given recently in the Y. M. C. A., Fairmont, for the purpose of complimenting the

officers and the men in the various departments for the splendid manner in which they handled the crowds occasioned by the recent Billy Sunday tabernacle meetings in Fairmont, W. Va. Captain Alexander, president of the company, expressed the belief that the Sunday meetings would not have proved the success they were had not the traction company been able to bring from a distance the 33,000 people it handled to and from the tabernacle. Mr. Alexander spoke further of the future of the railway, the creation of new business and courtesy as the cheapest means of acquiring new patronage.

"Courtesy," said the captain, "is the cheapest service that our motormen and conductors can offer the public. It is just as easy to give it as to refuse it. I ask you officials to impress upon the men under you the absolute necessity of extending courtesy on all occasions."

Through Indianapolis-Louisville Service Celebrated

The Interstate Public Service Company, operating between Indianapolis and Louisville, will put into service soon its new limited trains between the two cities. Harry Reid, president of the company, announces that seven trains each way will be operated when the new schedule is completed.

Seventy business men of Indianapolis and the cities along the interstate lines went to Louisville recently to return the call made a week before by representatives of civic and commercial bodies of Louisville and other cities along the route. The Hoosiers made the trip in one of the Interstate's new steel trains as the guests of Mr. Reid, L. M. Brown, superintendent; Bert Weedon, passenger and freight agent, and Ira Guthrie, auditor. The tourists returned to Indianapolis in the afternoon.

Charles S. Henry, who, in 1898, brought the first electric interurban car into Indianapolis over the Indiana Union lines and now operating head of the Indianapolis & Cincinnati Traction Company, was an interested observer of the operation of the new interstate trains. On both the outbound and return trips, Mr. Henry, with watch in hand, timed the train and frequently announced the time in excess of 60 m.p.h.

Bus Legislation Before Council

Jitney regulating legislation lies slumbering in the Council at Toledo. The jitneys have slashed their fares from 6 to 5 cents as an answer to the educational campaign of the railway to discourage riding in jitneys at the peril of higher fares on street cars under the service-at-cost plan.

The ordinance, which has been prepared by a special subcommittee of Council to regulate the buses, provides for a license fee of from \$150 to \$300 and an indemnity bond ranging from \$15,000 to \$30,000, depending upon the size and capacity of the bus.

Utah Ranks Second in Electric Mileage per Capita

With three electric railroads extending from Preston, Idaho, to Payson, Utah, 70 per cent of the population of the State of Utah lives in the territory through which the Utah portion of this unbroken line of electric railroads passes. Recent figures compiled under the direction of Ross Beason, traffic manager of the Salt Lake & Utah Railroad, which runs from Salt Lake City to Payson, Utah, show this fact. It is also shown that Utah is the second state in the Union from the standpoint of mileage of electric lines per capita. California ranks first, with 11.4 miles of track for each 10,000 persons. Utah has 10.1 miles of track for every 10,000 inhabitants.

During 1920 the Salt Lake & Utah Railroad carried about 900,000 passengers, or an average of more than 2,500 passengers a day for a distance of 18 miles. On this basis the average daily passenger train mileage is equal to the distance from Omaha to Chicago, and the passenger train mileage of all the electric lines in Utah will average a daily mileage equal to the distance from New York to San Francisco, according to Mr. Beason.

LARGE INCREASE IN FREIGHT TRAFFIC

From a few hundred cars of freight handled during the first year's operation of the Salt Lake & Utah, in 1914 and 1915, that road has increased its freight traffic until last year it handled 9,036 cars. This does not include 22,000,000 lb. of less than carload shipments carried between merchants of Salt Lake, Provo and other points on the line. During the first year's operation the less than carload shipments totaled 10,000,000 lb., representing an increase of more than 50 per cent in this line.

With a monthly payroll of practically \$34,000, this road now operates over a total of 92½ miles of track, 67 miles of which is main line, 9 miles of branch line and the balance in spurs and side-tracks.

BUSINESS HAS THRIVED

Over this trackage is operated daily about 130 steel, coal and freight cars, drawn by six electric locomotives, exclusive of the passenger cars, all of which is owned by the road. On this property, lying all within the State of Utah, taxes to the amount of \$50,000 are paid yearly. The property is owned and controlled by local citizens and interests.

During the brief period of its existence there have been sixty-one industries and manufacturing enterprises organized and now being operated in the territory through which this road passes. Among the plants that have come into existence have been four sugar factories, six canning factories, several lumber and coal yards and a number of wholesale and jobbing houses.

Transportation News Notes

Up-State Railway Wants Fare Rise.—The Elmira, Corning & Waverly Railway operating an interurban line connecting Elmira, Waverly and Corning, N. Y., recently petitioned the Public Service Commission for permission to increase its one-way fares 33½ per cent. In addition the company wants to discontinue all round-trip fares and cancel transfer privileges as now existing.

Increased Rates Refused.—The Pennsylvania Public Service Commission has denied the application of the Johnstown (Pa.) Traction Company to increase its fares from 7 cents to 8 cents with a ticket fare increase from four for 25 cents to four for 30 cents. In accordance with the new ruling the company will continue to charge a 7-cent fare, but it will have the privilege of selling four tickets for 28 cents or five for 35 cents instead of the present four for a quarter.

Fare Boxes in San Diego.—All cars of the San Diego Electric Railway have been equipped with fare boxes for the collection of fares, effective March 10. Previously the fares were paid directly to the conductor by the passenger. The new rules require the passenger to deposit the fare in box. At the same time metal tokens replaced the printed tickets for full fares through outer and inner zones. The metal tokens sell for the same price as did the tickets, four for 30 cents. The changes are expected, company officials state, to improve the service and speed up schedules.

Intrastate Tariff Filed.—Traction companies operating in Indiana filed a petition with the Public Service Commission on March 11 for a new schedule of through intrastate interurban fares. Officials connected with companies filing the petition stated that it is for the purpose of adjusting through tariffs to the present rate. It will result in an increase in rates over some of the existing through tariffs, according to officials. In all cases the lowest local fares have been used, however, in computing the through rate.

Increased Rates Suspended.—The Interstate Commerce Commission has recently ruled that the proposed new rates on the Washington-Virginia Railway, Washington, D. C., which were to have been effective on Feb. 13 be suspended for four months. Last April the price of twenty-trip tickets good for a period of two weeks was increased from \$2.70 to \$4. The road now seeks to increase the price of the round-trip from 38 to 48 cents and to increase the price of the monthly or fifty-two-trip book of tickets from \$4.46 to \$5.50.

Wants Higher Rates in Lynchburg.—The Lynchburg Traction & Light Company, Lynchburg, Va., will apply to the State Corporation Commission for increased railway rates as soon as the valuation of the property has been completed. J. N. Hancock, general manager, states that the company operating so long on pre-war rates has found it imperative to seek relief. In addition, he says that the company has been compelled to borrow money for certain improvements and now faces the necessity of raising still further sums.

Will Resume Line With Extra Fare.—Public Service Commissioner Barrett has granted permission to Lindley M. Garrison, receiver of the Brooklyn, Queens County & Suburban Railroad to resume operation on the Metropolitan Avenue surface line to Jamaica Avenue with an extra 5-cent charge between Jamaica Avenue and the Metropolitan Avenue station of the Myrtle Avenue elevated. The receiver's application for resumption of this line was referred to in the ELECTRIC RAILWAY JOURNAL, issue of March 12.

Increased Passenger Rates Sought.—The Indianapolis & Louisville Traction Railway, the Interstate Public Service Company, the Louisville & Southern Indiana Traction Company and the Louisville & Northern Railway & Lighting Company, operating lines in southern Indiana, filed petitions on Feb. 28 in the offices of the Public Service Commission asking for an increase of passenger rates from 2½ cents a mile to 3 cents a mile. The petitioners say in each case "that with the exception of your petitioner and affiliated companies all interurban electric lines within the State of Indiana are receiving not less than 3 cents a mile as their established passenger fare rates."

Temporary Fares Continued Until 1922.—The British Columbia Electric Railway, Vancouver, B. C., has opened negotiations for new franchises with the cities of Vancouver, North Vancouver and New Westminster and the Municipalities of Point Grey, South Vancouver and North Vancouver district. A temporary agreement permitting the present fares to be charged until June 30, 1922, has been signed and the company has withdrawn its application for a Dominion charter which would have taken the control of the company out of local or provincial authorities. Under the temporary agreement, new franchises must be signed before August 31, 1921, otherwise the company will be at liberty to renew its application for a Dominion charter. The company is at present charging 6 cents on its city lines with a 7-cent commutation rate to suburban zones.

Fare Decrease Protested in Washington.—The Capital Traction Company Washington, D. C., has filed with the Public Utilities Commission a petition to prevent the rate of fare on that system from automatically going back to 5 cents with a 2-cent charge

for transfers on April 1. George E. Hamilton, president, does not say definitely in the petition what rate of fare his company needs. He emphasizes two points: (1) That the Capital Traction Company could not operate under present conditions with a 5-cent fare and 2-cent charge for transfers, (2) that it would be unwise to establish separate rates of fare for the two companies if investigation shows that the Capital Traction could get along with a rate lower than the Washington Railway & Electric Company requires.

Application for Increased Rate Denied.—The Public Service Commission for the Second District of New York has denied the application of the Empire State Railroad to charge 10 cents in Oswego. In October, 1919, the company was permitted to advance its passenger rates from 5 cents to 7 cents. In that same order of the commission the company was allowed to operate one-man cars. It was not until September, 1920, eleven months after the authorization by the commission that the new schedule went into effect. This delay was occasioned by a controversy over the operation of the one-man cars without which cars the company did not care to put into effect the new schedule, and further on account of the destruction of some of its equipment by fire. Two months after the new rates went into effect the company applied to the commission for an increase in fare. The commission in denying the petition states that the 7-cent rate was based upon so short an experience, and now when other costs of living are diminishing it would not seem advisable to fix a higher rate.

New Fare Schedule Filed.—The New Jersey & Pennsylvania Traction Company, Trenton, N. J., announces that a 10-cent fare will be put into effect on the lines in Pennsylvania beginning April 12. The present rate is 8 cents. It is proposed to sell five strip tickets for 35 cents from Trenton to Morrisville, Pa., but cash fare will be 10 cents on all lines. On the Yardley and Newton division the fare will be 10 cents cash or eleven tickets for \$1. Riders on the Lambertville division will actually have their rate reduced, if tickets are purchased. There will be a saving of 10 cents if tickets are bought. The tariff schedule has been filed with the Pennsylvania Public Service Commission at Harrisburg, Pa., and the Interstate Commerce Commission at Washington, D. C. Although no change was expected in the 7-cent schedule between Trenton and Princeton, the company has recently applied for a 10-cent fare in each of its four zones between these two cities. The old utility board denied the company's petition to charge 8 cents. The board later issued an order suspending the proposed increase. In the meantime an inquiry will be made into the reasonableness of a 10-cent fare. The company wants the new rate to go into effect on April 12, when 10 cents will be charged on the divisions in Pennsylvania.

Personal Mention

J. R. Bibbins, Manager

Former Arnold Man Will Direct Recently Created Department of Transportation and Communication

James R. Bibbins, who has been a personal representative of Lieutenant-Colonel Bion J. Arnold, consulting engineer and president of the Arnold Company, Chicago, has been picked to manage the new department of transportation and communication, the creation of which was recently announced by the Chamber of Commerce of the United States. This department is one of the eight into which the chamber has been divided. Its range of activities will cover shipping, ocean and inland; steam and electric railroad transportation; air transportation, cables and telegraph; postal facilities and highways.

Mr. Bibbins brings to the new department a wide experience derived in consulting work, dealing with transportation problems of some twenty cities in the United States and Canada. He has had to do with rapid transit problems, railroad and port terminal activities, and civic development. He has studied the terminal problems of New York, Chicago, Baltimore, New Orleans, the transit plans of Chicago, San Francisco, Pittsburgh and other cities, and the valuation of property in New York, Brooklyn and Chicago.

MR. BIBBINS HAS WIDE EXPERIENCE

Mr. Bibbins has also had a wide experience in manufacturing and construction work. In 1902 he became associated with the Westinghouse Machine Company in East Pittsburgh, Pa., as a commercial engineer. During his connection with the Westinghouse interests his work included an intimate association with the development of prime movers, including gas engines, producers, turbines and condensers. Previously he had served in various technical capacities with the Detroit Public Lighting Commission, the Detroit Edison Company, and with the Detroit United Railway in operating and construction work. In 1909 Mr. Bibbins became associated in the work of the Public Service Commission of New York as assistant to Mr. Arnold, who at that time was a consulting engineer and director of appraisals on the commission. Mr. Bibbins was educated in Baltimore City College and the University of Michigan. He is a member of numerous engineering societies.

The chamber has long been active in transportation affairs. As a contribution of value to the railroad situation the chamber, in the latter part of 1918 and 1919, held a national transportation conference, bringing together

all of the interests concerned with transportation. The results of this conference, together with the result of a referendum vote of the chamber's membership on proposals for rehabilitation of the roads, were laid before Congress, which at that time was considering railroad legislation.

Mr. Reynolds in Youngstown

Former St. Paul Man Appointed General Superintendent of Youngstown & Suburban Railway

A. L. Reynolds was appointed general superintendent of the Youngstown & Suburban Railway, Youngstown, Ohio, by the Municipal Service Company, whose service he entered on March 1. Mr. Reynolds has been fore-



A. L. REYNOLDS

man of the Snelling car station of the St. Paul City Railway. He was in the operating department of the Twin City Rapid Transit Company there for about twelve years.

Mr. Reynolds began his railway training in the operating department of the Northern Ohio Traction Light & Power Company in 1907. The following year he took a position as a salesman with the B. F. Goodrich Company, and after remaining with that concern for a year again took up railway work with the operating department of the St. Paul City Railway as supervisor of transportation. Before the entrance of the United States into the war in 1917 Mr. Reynolds went to the Second Officers' Training Camp at Fort Snelling, Minn. He received there a commission as first lieutenant in the infantry.

Upon his return to civil life in 1918 he became identified with the Minneapolis (Minn.) Street Railway. During the latter part of 1918 he conducted for the company many public meetings in connection with its cam-

paign to explain to the people the cost-of-service franchise which the company was seeking to obtain from the city. This measure was defeated, but its failure to pass was ascribed to the limited time the voting public had prior to the election in which calmly to consider the matter rather than to any inherent defects in the measure itself.

In 1919 Mr. Reynolds was again transferred to the St. Paul City Railway by the Twin City Rapid Transit Company, and while with that company he acted as supervisor and also in various other capacities.

Mr. Reynolds was born in 1886 in Ashland, Ohio. He received his education in the grade schools of Akron, Ohio, and later attended Kenyon Military Academy at Gambier, Ohio. He is a graduate of Kenyon College, also in Gambier.

Paul Shoup Honored

Paul Shoup, president of the Pacific Electric Railway, Los Angeles, Cal., and vice-president of the Southern Pacific Company, San Francisco, Cal., was presented by a group of intimate friends with a life-size painting of himself at a dinner given in his honor at the Hotel St. Francis in San Francisco on Thursday, March 10. The portrait is the work of Arthur Cahill, who has painted the portraits of many eminent men.

William Sproule, president of the Southern Pacific Company, made the presentation address. Others who paid tribute to Mr. Shoup were Julius Kruttschnitt, chairman of the executive committee of the Southern Pacific Company; William Clayton, vice-president of the Spreckels companies of San Diego; Harry Chandler, president and general manager of the Los Angeles Times; William F. Herron, vice-president and chief counsel of the Southern Pacific Company; Herbert Fleishhacker, and C. W. Durbrow, attorney for the Southern Pacific Company. The dinner was attended by practically all the officials of both the Pacific Electric Railway and the Southern Pacific Company besides numerous other friends of Mr. Shoup in the industry.

Messrs. Esch and Potter Appointed to I. C. C.

John J. Esch and Mark W. Potter were nominated on March 11 by President Harding for appointment to the Interstate Commerce Commission.

Mr. Potter has been serving on the commission under a recess appointment by President Wilson. He has been very active in the work of the commission, having had charge of that branch which dealt particularly with the financial matters within the commission's jurisdiction. Mr. Potter's nomination was confirmed by the Senate on March 12. His term ends Dec. 31, 1923.

Mr. Esch, who has been chairman of the House committee on interstate and foreign commerce, was appointed for the full term of seven years to succeed Robert W. Woolley, whose term ex-

pired on Dec. 31. Mr. Esch has manifested a special interest in railroad and transportation affairs in Congress and has played a very active part in the framing of railroad legislation.

Under the plan of rotating chairmanship, the usual change in the chairmanship of the commission will not take place in March this year but at the end of June, when ordinarily fewer cases are before the commission.

Jersey Senate Finally Confirms Commission Appointments

Governor Edwards of New Jersey on March 21 sent to the Senate for confirmation the names of Judge Harry V. Osborne and former Judge John J. Treacy, Democrats, to be members of the Public Utility Commission, to replace the nominations of James A. Hamill and Joseph S. Hoff, two Democrats whose names the Senate rejected. The nomination of Harry Bacharach, Atlantic City, the only Republican suggested originally by the Governor, has been confirmed by the Senate. The Senate in executive session also confirmed the nominations of Messrs. Osborne and Treacy.

Judge Osborne came into prominence in 1908, when he won the Democratic nomination for State Senator in Essex County and was elected, although he ran in the primaries as an independent Democrat. He served a term of three years, and in December, 1911, he was appointed to the Essex County bench by Governor Woodrow Wilson, where he has since continued to serve, having been reappointed in 1913 and again in 1918.

Mr. Treacy was graduated from St. Peter's college in 1891 and entered the New York law school the following year. He received the degree of bachelor of laws in 1894 and in 1895 was admitted to the New York bar, where he became associated with the firm of Reed, Simpson, Thatcher & Barnum, of which the late Speaker Thomas B. Reed was the head. He was admitted to the New Jersey bar in 1901, and has practiced his profession in Jersey City since that time. He was a member of the Assembly in 1902 and 1903. He was appointed judge of the Court of Errors and Appeals by Governor Wilson on Dec. 8, 1911. In 1913 Mr. Treacy resigned from the judgeship. In 1914 he was appointed a member of the Public Utilities Commission.

Messrs. Brooks, Jr., and Ives Advanced at Detroit

Frank W. Brooks, Jr., former assistant general superintendent of the Detroit (Mich.) United Railway, has been appointed assistant to the president and general manager for that company to succeed W. E. Cann, who resigned recently to become Street Railway Commissioner at Toledo, Ohio.

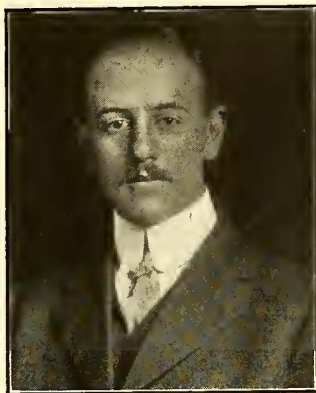
Edward H. Ives succeeds Mr. Brooks as assistant general superintendent of the company at Detroit.

Mr. Dana, President

Manager of Boston Elevated Elected Head of New England Street Railway Club

Edward Dana, general manager of the Boston (Mass.) Elevated Railway, was elected president of the New England Street Railway Club at its annual meeting held in Boston, Mass., on March 22. Mr. Dana succeeds I. A. May, comptroller of the Connecticut Company, New Haven, Conn. Mr. Dana is widely known in the electric railway field and is recognized as a specialist in transportation practice. The club may well be congratulated on having chosen a man of such proved ability to take the initiative in making the club of most value both to the industry and its members.

Mr. Dana was born in Bernardston, Mass., in 1886. He took a preparatory course at Stone's School, Boston, and completed his academic course in Harvard in three years, graduating in 1907. Shortly after receiving his degree he entered the employ of the Boston Ele-



EDWARD DANA

vated Railway as a conductor and since that time has had experience in nearly every department of the road.

He became particularly interested in the scientific aspects of transportation and has made extended trips throughout the entire country in connection with railway problems. He is a very frequent and valuable contributor to the *ELECTRIC RAILWAY JOURNAL*, his articles dealing principally with detailed analyses of the various phases of transportation.

Mr. Dana has been prominent in the deliberations of the American Electric Railway Association, where he is considered an authority on transportation matters. He has also testified as an expert witness for the Interborough Rapid Transit Company before the Public Service Commission.

The rise of Mr. Dana to general manager of the Boston Elevated was exceptionally rapid. After gaining much practical experience as a conductor, he was made assistant to the superintendent of transportation and soon afterward became traffic superintendent.

Having been transportation manager in charge of elevated and surface lines for several years, on August 8, 1919, he was selected as general manager by the Board of Public Trustees.

Mr. Moran Conducting a Publicity Campaign in Illinois

John J. Moran, of the Chicago, North Shore & Milwaukee Electric Railroad, Highwood, Ill., is traveling over the State of Illinois in the interests of the Illinois Committee on Public Utility Information. Mr. Moran is speaking before the Chambers of Commerce, the industrial organizations, men's and women's clubs, and before students in universities, colleges and the larger high schools.

It is the idea of Mr. Moran and of the Illinois Committee on Public Utility Information to inform the people of the real facts about electric railway investments in the United States. The people are also told the part which the railways take in the economic development of the country by citing the number of passengers and the amount of freight which they carry, and the number of men which they employ. It is hoped that the public by this method of education may be brought to appreciate the point of view of the railways in order that co-operation and good will may exist between them for their mutual benefit.

Mr. Armstrong Promoted

E. E. Armstrong, for the past two years general superintendent of the City Light & Traction Company, Sedalia, Mo., has been transferred to the Meridian Railway, Light & Power Company, Meridian, Miss., by the Doherty interests to hold a like position. Mr. Armstrong, in assuming his new duties, will be under General Manager W. B. Malone, at one time in charge of the commercial department of the City Light & Traction Company. No successor has yet been announced for Mr. Armstrong's place.

During the two years that Mr. Armstrong has been in Sedalia he has proved a most capable official and has made many personal friends in business and other circles. Previous to going there he was in service in the World War and before that time had been employed with the Doherty interests at Denver, Col., and at Bartlesville, Okla. For a time he was in the New York offices of the Doherty company.

N. K. Smith Made Superintendent

N. K. Smith, formerly trainmaster of the Indiana Service Corporation, Fort Wayne, Ind., has been appointed superintendent of the Fort Wayne, Van Wert and Lima line of the Ohio Electric Railway. His appointment was recently announced by S. W. Greenland, general manager for the receiver of the Fort Wayne-Lima line. Mr. Smith will locate in Van Wert and will be in active charge of the operation of the road.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER.

SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES

BUSINESS ANNOUNCEMENTS

Good Stocks of Rattan Car Seating Material

Present Prices Represent Ten to Fifteen per Cent Reduction from Peak—Rattan Cost Unchanged

Though there has been no price change in the car seat market now for several weeks present quotations of rattan car seating material represent manufacturers' reductions of from 10 to 15 per cent compared with peak prices. At the same time rattan for snow sweepers was reduced about the same amount. Finished rattan seats for electric railways have been reduced slightly since the first of the year, but prices of seats furnished to steam roads remain at their peak. There is keen competition among buyers of rattan in the Far East at present, for demand is said to be strong from a number of sources other than the railway industry, and foreign countries are buying more of this material now too. Consequently the cost of rattan is as high as ever.

Ship bottoms are plentiful and car seat manufacturers here can obtain a supply of rattan in approximately three months. A sizable reserve supply is kept on hand sufficient to insure stock deliveries of repair material at the present time. The favorable delivery situation is further augmented by the light buying of steam and electric lines. A fairly good volume of business still remains from orders placed some time ago, and manufacturers are hopeful that this will tide over production on a curtailed basis until the looked-for improvement in demand materializes.

Railway Material Prices in England Show Large Increase Since 1914

To those familiar with the big increase in cost of virtually all material used by electric railways since before the war, the following table affords an interesting basis of comparison with the cost increase along kindred lines in England. The figures are prepared by the manager of the West Ham Corporation Tramways, England. The percentage of price increase for fifteen

	1918 Per Cent	1919 Per Cent	1920 Per Cent
Axles.....	100	226	196
Tires.....	156	206	283
Gear wheels.....	80	175	175
Pinions.....	233	350	216
Trolley wire.....	85	100	33
Motor grease.....	150	216	176
Oil light journal.....	236	250	240
White lead.....	100	140	255
Bolts and nuts.....	165	226	274
Span wire.....	120	180	180
Tickets.....	143	157	200
Trolley wheels.....	73	80	80
White metal.....	66	83	89
Timber.....	60	70	75
Print'g and stationery	250	350	350

items in 1918, 1919 and 1920 over pre-war prices is presented. The table is similar to one appearing on page 1287 of the June 19, 1920, issue of *ELECTRIC RAILWAY JOURNAL*, covering the price at that time of 52 items used by traction companies in this country, in relation to existing prices in 1914 and 1919. Of the eight items which appear in both tables, the average percentage of price increase in 1920 over 1914 is 127 per cent in this country and 184 per cent in England.

Stock Deliveries of Paint

Electric Railways Showing Little Interest in Spring Painting Market

Buying of paint by electric railways thus far this year has been negligible. Traction companies are not only avoiding stocking this material but they have also given little indication that there will be the usual amount of spring painting of cars done this year. There is some buying for immediate needs, it is true, and this combined with general demand has provided a fairly good volume of current business, several producers report. Optimism is quite generally expressed to the effect that total sales this year will equal the figures of 1920, as the general expectation is that demand even from steam and electric railways will increase considerably before long. Paint producers think that difficulty in readjusting wage scales on the part of both electric and steam lines is an important factor in delaying buying.

Stocks of finished paint in general are not large for production in a number of instances has been curtailed to a point commensurate with buying. The surplus supply is adequate, however, to insure present delivery from stock in virtually all instances.

Prices on paints used by electric railways have declined anywhere from 25 to 50 per cent compared with peak quotations. There has been no general reduction for more than a month, however, and several manufacturers state that in their opinion the market has hit bottom. On the other hand, it is admitted there is some slight room for lower costs through wage readjustments, but this will not be felt for quite some time.

White lead in oil in 100-lb. kegs, lots of less than 500 lb. is today quoted at 13 cents New York, compared with 14½ cents on Dec. 1, 1920; raw linseed oil in 5-bbl. lots is worth 68 to 69 cents per gallon compared with 85 cents on Dec. 1, 1920; and turpentine in barrel lots is quoted at 58 cents per gallon compared with 95 cents on Dec. 1, 1920. Varnish gums have declined about 40 to 60 per cent from their peak prices.

Heavy Declines in Scrap Steel Prices

There Is Little Activity in the Market, However, and Quoted Prices Do Not Represent Real Values

With the low prices prevailing there is little incentive for railways to sell their steel and iron scrap except to get rid of stock or to realize what can be realized on the transaction. The market is very quiet, with here and there a sale reported. Dealers feel that this scrap is a good investment at the present time and that general prices can go little lower. They see a quick return to higher prices when the demand for scrap does set in though, regardless of the uncertainty as to when that time shall come. As has been the case heretofore, this demand will be felt directly after that in the steel trade shall set in.

Quoted prices are felt to reflect no true condition of the value of steel scrap but merely the figures at which railroads, etc., will release their materials. There is little scrap coming from new manufacturing. The steel mills are not using much of the material under their curtailed operation but railroads are taking every advantage in reclaiming springs, bolts, axles, etc.

RAILROADS LARGELY GOVERN PRICES

Prices even since Jan. 1 show extensive reductions. For instance, in the Chicago market old steel axles are off \$2.50 to \$14.50-\$15.00; old iron axles are off \$3.50 to \$26.50-\$27.50. Steel springs show a \$4.50 drop to \$13.50-\$14.00, while machine shop turnings are off 50 cents to \$5.50-\$6.00. These are all for net tonnages. In gross ton lots since Jan. 1 car wheels are \$7 lower to \$14.00-\$14.50; railroad malleable \$2.40 to \$15.50-\$16.00; frogs, switches and guards are off \$2.50 to \$12.00-\$12.50, and old steel rails, short, are \$1 low to \$13.00-\$13.50. It is felt that some of this material, notably old rails, could be purchased under these figures, but there seems to be insufficient storage space with the dealers to purchase large amounts to hold in storage for any considerable time awaiting a market return.

Heavy tonnages of scrap have been sold by the Pennsylvania Railroad Company since the first of the year at quoted prices on the days of sale.

Electric Railway Proposed in Norway

The commercial secretary to his Majesty's Legation at Christiania, according to the London *Electrical Times*, states that the Norwegian Government has granted a concession to "A/S Akerabanerne" to construct an electric

railway from Majorstuen through Taasen to Sognsvandet, and from Taasen to Sagene, a suburb of Christiania. Preliminary work in connection with the grading of the proposed route will begin at once. Tenders will not be issued until the end of the present year. Application has recently been made to the Norwegian Government by "A/S Akerabanerne" for a further concession in connection with a proposed railway from the center of Christiania to Ostensjo, a distance of about eight kilometers. If the latter concession is granted it is proposed to construct both lines simultaneously.

Wire Production Curtailed Under Light Demand

Prices Ruling on All Classes of Bare and Insulated Wire Are at Extremely Low Figure

Manufacturers report that demand for insulated wire is quiet. Jobbers are still for the most part endeavoring to get rid of supplies on hand, contractors have not much to do except small repair jobs, the promise offered by a return of the building industry yet hangs some months off on the horizon and utilities are short of money. For these reasons producers apparently do not expect a return of strong demand in the near future. Production is considerably curtailed, operation at from 50 to 75 per cent of capacity being about the general average. Stocks are gradually piling up, however, and deliveries are prompt, with shipment from stock up to a matter of two weeks prevailing.

PRICES REFLECT EXTREME LOW LEVEL OF RAW MATERIALS

Prices are thought to have reached rock bottom as copper, cotton and rubber are all about as low as they can go, it seems, while wage reductions have also been made to some extent. Consumers in many cases admit that present wire prices are attractive but say that money conditions prevent their stocking up. A carload lot of No. 14 rubber-covered wire is quoted by several representative producers at from \$7.50 to \$7.75 per 1,000 ft., but it is known that these quotations have been cut considerably by smaller producers. An average base working price for weatherproof wire at the present time would probably be about 16 cents, though most manufacturers are not quoting base prices.

Bare-copper wire business presents much the same conditions as does insulated wire. Utilities are buying some but not much, and demand from electric railways is very largely only for repairs. The finer sizes of bare wire, which last summer were so hard to obtain, are now even in less call than the large sizes, and stranded wire, as demand for purposes such as small motor manufacture, is especially slow. There is considerable optimism, however, regarding prospects of present conditions improving. Deliveries of

bare copper wire are all that can be desired, as orders are filled in about ten days to two weeks. A representative base price would be about 14½ to 15 cents.

Manufacturer of Gear Cases Again Reduces Price

One of the large manufacturers of sheet steel gear cases has reduced the price on this product approximately 5 per cent effective March 15. So far as can be learned other producers have not followed this company's example in again reducing prices. The reduction mentioned above follows a cut of 7 per cent made by this company early in January. Other manufacturers soon after that followed suit with reductions of about 10 per cent on both sheet steel and malleable iron gear cases, the price decreases taking effect the middle of January and the early part of February in different instances.

Present demand is not large and although deliveries are prompt several manufacturers report that they are not carrying overly big stocks. This is perhaps due to a feeling that prices of the raw material have not yet reached rock bottom.

Westinghouse Drops Price of Small Supply Items

Effective on March 10 the Westinghouse Electric & Manufacturing Company has again reduced prices on the 60,000 to 80,000 supply items contained in catalog 10-A. The reduction varies, but averages on the whole about 6 per cent. Included in the items affected are commutator and controller copper parts, resistance grids, armature and field coils, brush holders, transformer replacement parts and parts for electrical machinery in general.

Rolling Stock

Centralia (Ill.) Traction Company has purchased four standard double-end safety cars from the National Safety Car & Equipment Company, St. Louis, Mo.

Wisconsin-Minnesota Light & Power Company, Eau Claire, Wis., has purchased four standard double-end safety cars from the National Safety Car & Equipment Company, St. Louis, Mo., for use in Eau Claire.

Tidewater Southern Railway, Stockton, Cal., which operates between the cities of Stockton, Modesto and Turlock, Cal., has purchased a 60-ton electric freight locomotive from the General Electric Company. Delivery is to be made early in the summer in time to handle the crop movements which make up a considerable portion of the freight business on this line. The company has pending before the California Railroad Commission an application for the issue of \$49,000 of first mortgage 5 per cent gold bonds for security on a promissory note to be applied on the purchase of the new locomotive.

Franchises

Ontario, Canada.—Representatives of the municipalities of Galt, Preston and Kitchener have asked the Ontario government to open the way for Galt and Kitchener to enter into agreements between the municipal corporations and the Grand River Railway, a subsidiary of the Canadian Pacific Railway, for an extension of the existing franchises. Under the old Beck act the municipal councils can give an extension only for a year without a vote of the people, and under the agreements signed in connection with the Elmira, Galt, Preston and Hamilton radial system such an extension is further made subject to the Ontario Power Commission sitting as a court and hearing the views of other interested municipalities. Premier Drury promised consideration.

Track and Roadway

Phoenix (Ariz.) Railway.—The Phoenix Railway has begun work on the various improvements ordered by the commission. The crossings at Tenth Street, Willetta and Brill Streets have been paved. The commission outlined an improvement plan some time ago with the condition that if the company failed to do the necessary work the city would start the work and bill the company. The city was about to begin the work when the railway started paving.

Pacific Electric Railway, Los Angeles, Cal.—The Pacific Electric Railway will put in new rail, ballast and paving on South Mt. Vernon Avenue, San Bernardino at a cost of \$33,000.

Indianapolis (Ind.) Street Railway.—The Indianapolis Street Railway will be asked to make many extensions to its line according to George Lemaux, president of the Indianapolis Board of Public Works. The following are proposed: Extension of College Avenue line from Forty-sixth to Fifty-first Street; removal of tracks of Meridian Heights line now in Forty-ninth Street from Pennsylvania Street to College Avenue and relay them in Pennsylvania Street from Forty-ninth Street to Fifty-second; extension of Illinois line from Thirty-ninth Street to Forty-sixth.

United Railways & Electric Company, Baltimore, Md.—The United Railways & Electric Company has extended its St. Paul Street line from Thirty-first Street and Greenmount Avenue over the Gorsuch Avenue route.

United Railways & Electric Company, Baltimore, Md.—The United Railways & Electric Company has received petitions urging better service in certain sections of the city. The principal plan under consideration is to correct the present rush-hour congestion for through trains on Fulton and Pennsylvania Avenues. To remedy this a tube under Druid Hill Park is proposed. It would mean the first underground operation of electric cars in Baltimore.

Southern Public Utilities Company, Charlotte, N. C.—The Southern Public Utilities Company operating in Greenville, S. C., has been granted permission to build a double track line on Pendleton Street, Greenville, which will afford better facilities from the western and southern suburbs to the city. All work incident to street widening will be undertaken by the railway.

Oklahoma Railway, Oklahoma City, Okla.—The Oklahoma Railway is considering various routes for a new extension to Lincoln Park in Oklahoma City. Construction of the line will require about sixty days and will cost approximately \$40,000. One plan is to extend the McNabb line to Lincoln Park, making the total length of the two lines 2½ miles.

Cincinnati, Ohio. — Estimates for Section 4 of the Rapid Transit Loop, Cincinnati (Ohio), were approved recently by the Rapid Transit Commission. City Engineer Frank Krug, estimated that it would cost \$506,408 to build that part of the loop from Mohawk to the Brighton Bridge. After the estimates were approved Mr. Krug was directed to start advertising. April 1 for bids.

Johnstown (Pa.) Traction Company.—The Johnstown Traction Company will start work on improvements within the next month. An investment of \$248,000 will represent the total track-
age improvement which will include rebuilding the Franklin Street line and relaying track on the Horner Street line.

Reading Transit & Light Company, Reading, Pa.—The Norristown Town Council has adopted a resolution that if the Reading Transit & Light Company does not begin the work of repairing streets over which the trolleys operate in Norristown before April 15 court action will be taken. The railway has delayed this improvement because of lack of funds.

Power Houses, Shops and Buildings

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md.—Work will be started on the new \$850,000 station and terminal of the Washington, Baltimore & Annapolis Electric Railroad on April 1. This station will be located at Howard and Lombard Streets. It will be equipped with every modern convenience.

Public Service Railway, Trenton, N. J.—The Public Service Railway has informed the City Commission of Trenton, N. J., that it cannot afford at this time to build the proposed trolley terminal at State and Warren Streets, Trenton. The company some time ago purchased the old Trenton Bank, a marble structure, for the purpose of housing its cars in the center of the city and providing a waiting room for passengers. The Trenton Commission requested the railway to have a representative before it and explain matters.

Professional Notes

Dwight P. Robinson & Company, Inc., are the designers of the new shops for the Boston Elevated Railway, described and illustrated in the issue of this paper for March 19, page 555.

McKay & Sherman, 741 Monadnock Block, Chicago, has been formed by Charles W. McKay and P. C. Sherman for the practice of engineering valuation of industrial and public utility properties.

Trade Notes

The Bethlehem (Pa.) Steel Company announces the appointment, effective at once, of E. E. Goodwillie as sales agent in charge of its Cleveland office.

The Automatic Reclosing Circuit Breaker Company, Columbus, Ohio, announces the opening of an office at 510-512 Brown-Marx Building, Birmingham, Ala., in charge of B. M. Rogers.

The American Atmos Corporation, Pittsburgh, manufacturer of the Atmos and Dreager oxygen resuscitation and breathing apparatus, announces the appointment of George Oliver Smith as vice-president and chief engineer.

The Cincinnati Electrical Tool Company, Freeman Avenue, Cincinnati, Ohio, has been authorized to increase its capital stock from \$75,000 to \$225,000. The company, it is stated, does not contemplate any immediate extensions.

The Independent Pneumatic Tool Company, 600 West Jackson Boulevard, Chicago, announces the removal of its Pittsburgh office from 1208 Farmers' Bank Building to 718 Bessemer Building, Sixth Street and Duquesne Way.

The Simplex Wire & Cable Company, 201 Devonshire Street, Boston, announces that it has made arrangement with the Eastern Engineering Company, with main offices in Tampico, Mexico, to handle its products in that country.

The Simmen Automatic Railway Signal Company, manufacturer of speed control devices, cab signals, block signal systems and automatic recorders of train movements, has moved its offices from Buffalo, N. Y., to Eden, N. Y.

The Celluloid Zapon Company, 200 Fifth Avenue, New York City, manufacturer of lacquers, insulating varnishes, lamp frostings, etc., announces the opening of its Philadelphia office at 520 Walnut Street, in charge of B. O. Clausen.

The Wagner Electric Manufacturing Company, St. Louis, announces the removal of its Boston office and service station to 342 Newbury Street, where it will occupy the entire building. Brooks Faxon will continue in charge as district manager.

The Keystone Hair Insulator Company, 1243 Spring Garden Avenue, Pittsburgh, manufacturer of electrical equipment, is reported to be receiving

bids for the erection of a three-story building, 70 ft. x 100 ft., in the vicinity of its present plant.

The Hazard Manufacturing Company, Wilkes-Barre, Pa., manufacturer of wire rope and electrical wires and cables, has opened a new sales office and warehouse at 1701-1703 First Avenue, Birmingham, Ala., in charge of R. J. Bravard, district manager.

The Brandywine Fibre Products Company, Wilmington, Del., announces that it is now in a better position than ever before to take care of hard vulcanized fiber tubing in standard mill lengths or parts machined to order. The company has recently doubled its capacity in floor space and trebled its equipment.

The Acme Wire Company, New Haven, Conn., announces the opening of its Chicago office at Room 1105, Monadnock Block, 53 West Jackson Boulevard, in charge of H. B. Bassett. The company also maintains branch offices in the Guardian Building, Cleveland, in charge of J. T. Crippen, and in New York City at 52 Vanderbilt Avenue, in charge of H. S. Glasby.

The American Insulator Corporation, New Freedom, Pa., announces the appointment of the Albert J. Cox Company, 564-570 West Monroe Street, Chicago, as its sales representative in the States of Illinois, Indiana, Missouri, Iowa, Minnesota and Wisconsin. The Albert J. Cox Company will handle the "Aico" line of products, consisting of cold-molded insulating parts for electrical units.

New Advertising Literature

Diesel Engines.—The Busch-Sulzer Brothers Diesel Engine Company, St. Louis, is distributing a bulletin describing its Diesel engines in large hydroelectric, stand-by and auxiliary plants.

Boiler Plant Economy.—The H-S-B-W Cochrane Corporation, Philadelphia, has issued a second revised edition of "Finding and Stopping Waste in Modern Boiler Rooms." The book is cloth bound and contains 414 pages.

Circuit Breaker.—The Automatic Reclosing Circuit Breaker Company, Columbus, Ohio, is distributing its new bulletin No. 312, which covers the theory of operation and application of the automatic reclosing circuit breaker.

Safety, Sanitation and Welfare.—The Bureau of Safety, Sanitation and Welfare of the United States Steel Corporation, 71 Broadway, New York City, has issued bulletin No. 8, containing ninety-five pages of illustrations of what has been done to improve living and working conditions of employees.

Line Equipment.—The Electric Power Equipment Corporation, Thirteenth and Woods Street, Philadelphia, has issued bulletins Nos. 103, 104, 200, 202, and 600, covering its indoor choke coils, copper fittings, pole-top switches, outdoor bus supports and control switches respectively.