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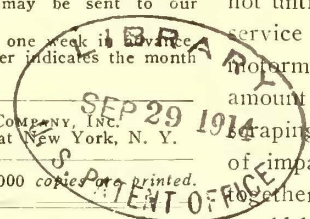
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ADVANCE REGISTRATION AT THE CONVENTION

One of the methods which have been introduced by the American Electric Railway Association during the past few years to expedite the work at the annual convention has been the plan of advance registration. It is an excellent idea, because with an attendance of from 3000 to 4000 which may be expected at an electric railway convention the actual mechanical work of transcribing this number of names and titles and issuing badges takes a great deal of time, and there are many possibilities for mistake. This year the plan is being extended to include the representatives of manufacturing companies which are planning to exhibit at the convention, so that the greater part of those expected at Atlantic City will now be included. The success of this plan depends entirely upon the active co-operation of those to whom advance registration cards have been sent. Unless they forward the names, the preliminary efforts of the association to reduce congestion at the registration booth during the early part of the convention will be nullified. The replies to cards already sent out indicate that the attendance this year will probably be the largest in the history of the association, so that it is necessary that everything should be done to facilitate the work at the opening of the convention and thus not delay the beginning of the sessions. Those who are still considering the question whether it will be worth while to attend the convention would do well to read again the program published in the last issue of this paper. It is not too much to say of it that at no previous meeting have the topics to be considered by each association been of such vital interest to the membership at large. It would be impracticable as well as unnecessary to refer here to each program in detail, but the subjects committee as well as the executive committee of each organization should be congratulated upon its work during the past year.

CURVED TRACK SPACING FOR NEW CARS

A recent accident, fortunately of negligible importance, calls attention to the undesirability of double-track curves upon which any two cars on the system cannot pass each other without fouling. In the case in point only a few of the cars on the line are too long to clear each other when run simultaneously around a certain curve in opposite directions, and the rule covering car operation at this place was apparently quite prominently featured, for it was not until the day of a motormen's outing, when the regular service was being conducted by the less experienced extra motormen, that an accident occurred. This happened to amount to only a broken side post or two and a general scraping, but if any passengers had been seated at the point of impact a very serious accident might have occurred together with an incontestable claim for damages which would have covered the cost of replacement of the improperly spaced tracks several times over. Such cases are by no means rare even in cities where there are no physical difficulties in the way of a wider spacing of tracks. The reason for this is that as new cars have been purchased they are often longer and sometimes wider than those for which the curves on the line were originally laid out. Yet the increased size of these cars ought to offer advantages sufficient to warrant the expense of arranging the necessary track spacing because the necessity for the avoidance of passing another car on a curve is a limitation which may often be overlooked by a new motorman.

ANNUAL OUTINGS FOR RAILWAY EMPLOYEES

In a recent issue mention was made of an outing given by Benjamin S. Hanchett, president of the Grand Rapids Street Railway, for the company's employees and their families at Lakewood, his suburban home. This picnic is a good illustration of the spirit with which the delicate problem of labor versus capital can be handled by executive officials. Too few public utilities recognize the value of such an outing as a means of establishing a more intimate relation between officers and employees and of obtaining the confidence and good will of the men. It is often forgotten that electric railway employees have to work hardest while others play. On the big national and local holidays, like Independence Day and Labor Day, they are busy at all hours, and for this reason they can particularly appreciate a day all their own. For eleven years this practice has been carried out on the Grand Rapids line, but this year the crowning glory was reached through the opening of the president's home to the men and their families. This, of course, is a step not always possible for electric railway officials, but where it can be done, we can conceive of no better means of showing the employee that he is regarded as more than a mere cog in the machine. Such knowledge is of infinite weight in the inspiration it gives the employee

to loyal and willing labor. Ordinary welfare work from day to day has its place, of course, but its value can be enhanced if one day of the year is set aside when office men, shop men, motormen, conductors, switchmen and trackmen may all rub elbows. Such an assembly not only has a great influence on the *esprit de corps* of the whole organization, but while cementing the friendship of the employees and the company it serves to secure the good will of the public. The Grand Rapids *Evening Press*, in speaking of the outing under discussion, said: "It is the spirit on the part of the corporation which arrests the attention. If the attitude toward its employees were more general on the part of corporations throughout the country there would be fewer and less costly strikes."

ANALYZING LENGTH OF SERVICE

The broadest administration of an electric railway of any real magnitude requires many analyses outside the equipment field, and of these none is of greater interest and value than the investigation of the length of employees' service. The classification of motormen and conductors according to their terms of employment may be highly suggestive, particularly on properties where a sliding scale of wages prevails. If there is any tendency on the part of a considerable number of men to leave the service at the expiration of any stated period, it deserves early investigation, and the analysis of employment records to find out the existence of critical points in the relations of individuals to the company should be kept up year after year.

It goes without saying that every progressive manager desires to retain the services of efficient trainmen and to reduce to the lowest feasible amount the work of breaking in raw recruits. The cost of replacing an efficient man at either end of the car represents a waste of money in many cases, as we have frequently said. New human material must always be entering railway service, and its training must form an important part of the transportation department's work, but in the past the evils associated with a constantly shifting rank and file have not always received sufficient thought. Here, then, is the opportunity of the service period analysis, including the listing of men in groups from one year's service or less up to the maximum and the consideration of equipment changes, wage changes and other matters affecting the employee's satisfaction in his working conditions. If a large percentage of new men leave the service at the end of six months or a year, let the reasons for this be tabulated and studied without prejudice; or, again, if the majority leave at the end of two years or of eighteen months, the reasons should be sought and if possible the trouble should be corrected. Then, too, the attitude of the men toward long service may vary from year to year, and if by curve plotting or other graphic methods tendencies in the direction of resignations and discharges can be seen, much good may be accomplished. In brief, the trained man represents a certain capitalization of expenditure for instruction just as the modern soldier represents an investment which efficient administration seeks to preserve to the longest term of service. The comparison of service statistics with wage scales from year to year is illuminating, disclosing now and then breaks in the rate of increase or

irregularities in compensation which might be corrected without hardship to the company, and which would tend to encourage longer service from desirable men. There is ample material here for some very thorough study in relation to the maintenance of an efficient operating force, and the data are so easily assembled and analyzed that there is little excuse for overlooking their interest. There is a sharp dividing line between the elimination of the unfit and the voluntary and perhaps preventable withdrawal from the service of many excellent men upon slight cause.

A NEW POLITICAL SLOGAN

The political situation in New York in connection with the coming mayoralty election has suddenly become changed as a result of the death of Mayor Gaynor, one of the candidates. In consequence there will have to be a re-alignment of forces. But it is interesting to record that in spite of other radical differences in policy all of the three parties which nominated candidates for Mayor of New York this year were a unit on one matter. Each of them tried to claim for its nominees as much credit as possible for the execution of the present contract for rapid transit extension now going on in the city. One nominee boasts that he was chairman of the Public Service Commission at the time when the contracts were signed and so made the system possible. Another, Mayor Gaynor, early adopted as his campaign emblem the shovel to typify his great interest in railway construction. The third recognized that his record was somewhat weak in this matter because at one time he opposed the contracts. But he has announced that now that they are signed he has no power or intention of changing them, and his supporters urge that any previous lukewarmness on his part in regard to this matter is more than made up by the undoubtedly good work done by his two associates on the ticket, who steadfastly supported the rapid transit plan and probably did more than any other two city officials to bring it about.

In other words, each of the three political factions or parties that nominated candidates for Mayor recognizes that the most popular action by the city for a long time has been the arrangement by which the two existing rapid transit companies in Manhattan and Brooklyn will be able to extend their systems and add to their trackage in this city. It should be pointed out in this connection that the extensions permitted under the contract are by no means exclusively subway, but are in a large part elevated. In fact, even exclusive of the new third track which will be laid on the existing elevated lines in Manhattan, the miles of elevated track for which provision is made under the new contracts exceed in length the miles of track which are to be underground.

The moral is obvious. In many cities it is supposed to be a part of political wisdom for candidates for office to attack the large corporations, especially the public utility corporations, and to put every obstacle in the way of the extension and improvement of their systems. This was thought to be the popular course at one time in New York. But the long discussion of the rapid transit problem made the voters realize that their interests and the interests of the public utility companies are largely the same. It took

some time for the political powers to understand this because it was so different from any of their traditions. But now they have begun to see the light, and the best claim for popularity now in New York is advocacy of the new subway and elevated railway lines.

THE REMUNERATION OF STREET RAILWAY OFFICIALS

The publication in connection with the Boston arbitration hearings of the salaries of the fifty-one principal officers of the Boston Elevated Railway Company is an unusual incident in proceedings of this kind. In its willingness to afford the arbitrators every possible scrap of information of use in the case the company prepared such a list, and it was introduced into the testimony at the request of the counsel for employes and made public by a ruling of the board of arbitrators. The list in its entirety may have satisfied the curiosity of some people, but it is hard to see just what connection exists between the compensation of an executive officer on such a system as that of the Boston Elevated Railway and the question under consideration by the board. The market value of human services varies extraordinarily in different parts of the world and in all lines of business, while the principal factor of the examination under consideration is the market price of the ability to perform the tasks required in car operation by motormen and conductors.

In all large corporations, especially in those where men of different degrees and classes of ability are required, the rates of compensation are certain to vary in considerable and even in great degree. But the fact that one man receives a higher salary than another is no evidence that he is being paid more than he is worth. In fact, it would be the worst kind of economy for a large industrial or transportation company to intrust its important corporate, financial or engineering affairs to men with low salaries, if this meant men of mediocre ability, because they might easily make an error in judgment every day or every week which would cost their employers many times their annual salary.

Nevertheless, a close examination of the salary list in Boston does not disclose any startling figures. Of the officials named, who range from the chief executive to a yardmaster at the mechanical headquarters, the average annual compensation is \$4,492. There are eight officers receiving individually \$10,000 or more per year. Sixteen receive \$5,000 or over; twenty-nine, \$3,000 or over, and forty-three, or 84 per cent of the list, receive \$2,000 or more per annum. These salaries are not excessive in a company with a stable organization and office holdings of long duration. Many boards of astute directors can be found who gladly authorize such salaries, and the officers in question could undoubtedly obtain as high if not higher remuneration in other lines of work. Certainly in a great deal of the work involving the rehabilitation of railway companies in receivership, where the adequacy of the payments is passed upon by the court, it is easy to find examples of much greater payments for services in corporate affairs similar to those rendered by the officials of the Boston Elevated Railway.

NIAGARA POWER IN BUFFALO

The Buffalo Railway Company, one of the earliest large purchasers of Niagara power, did not rush into the new venture when this power became available but tried it out on a small scale for a time to supplement the output of a power plant which when built represented the best practice in its line. Since then Niagara power, proving satisfactory as to cost and reliability, has been used increasingly until of late it has become the main reliance of the railway, now the International Railway Company.

In making payments for power a certain minimum or "firm" power, approximately set for different seasons in advance, is charged for at a reasonable rate regardless of consumption. Power drawn in excess of the firm power is charged for at a higher rate, which encourages the use of all devices tending to keep down the peaks in the load line. As a consequence the railway company has utilized its steam plant and a large storage-battery equipment to their utmost capacities in a remarkably successful attempt to keep down the peaks and to maintain a uniform load. The load-factor of the purchased power, according to the typical charts used in the descriptive article printed in this issue, was over 68 per cent on Feb. 24, 1913, and over 62 per cent on July 15, 1912.

Unfortunately from the standpoint of economy, there is no method available for filling in the nightly load-line depression so that 20 per cent, more or less, of the energy which must be paid for cannot be utilized, and the storage batteries, large as they are, are unable to eliminate in this condition. However, the International Railway Company has recently added several hundred near-side cars to its rolling-stock equipment, thus greatly increasing the demand for power. This demand is being met by providing new substations and utilizing more Niagara power, and the fact that the steam plant is not to be enlarged is significant.

The Buffalo storage batteries have been of interest to railway men for a long time. When installed ten or more years ago they were of notable size. They have been maintained and operated with great care and have served as reserve and for the keeping down of peaks. Judged merely from the financial standpoint, the cost of the energy which they deliver, slightly over 1 cent per kw-hr., is very high. This involves the maintenance expense and the fixed charges only, the cost of energy in this case being nothing as the batteries are charged with power which could not otherwise be utilized.

The fact, however, that the company continues the use of the batteries and has closed a contract for ten years' additional maintenance is evidence that this high cost is justified in the ways mentioned. The fixed charges at 6 per cent amount to $\frac{3}{8}$ cent per kw-hr., and it would pay to scrap the battery to save maintenance cost if its expensive output was not really economical. The reserve power supplied by the steam plant costs only half as much per kilowatt-hour as that furnished by the batteries, but, on the other hand, the battery is always ready for use and automatically adjusts itself to load conditions. It therefore supplements the steam reserve and justifies its existence to the extent that it keeps down fluctuations and maintains power on the line while the steam equipment is being brought into action.

New 3000-kw Substation in Fort Worth, Tex.

A Description of a Modern Substation Recently Completed by the Northern Texas Traction Company Which Embodies Meritorious Features in General Arrangement, Station Wiring and Building Design

With the completion of the Fort Worth Southern Traction Company's 32-mile interurban line between Fort Worth and Cleburne, Tex., and a number of extensions to the city lines of the Northern Texas Traction Company in Fort Worth, additional substation capacity was required to assume the increased railway load. The management of the Northern Texas Traction Company anticipated this demand and the Stone & Webster Engineering Corporation, representing the holding company, prepared plans and specifications, and the work of building the substation was started so that it would be ready for service when the new lines were completed.

According to the original plans, one 750-kw rotary was to be transferred and two 400-kw rotaries and one 300-kw rotary, with the other substation equipment, were to be removed from the old substation to the new building. During the progress of construction, however, it was decided that the total substation capacity obtained by the addition of one new 750-kw machine to the three old ones would not be sufficient to meet immediate future requirements. Following this decision, three more 750-kw machines were purchased for the new station, and the old rotaries and other substation equipment were utilized in increasing capacity at other points.

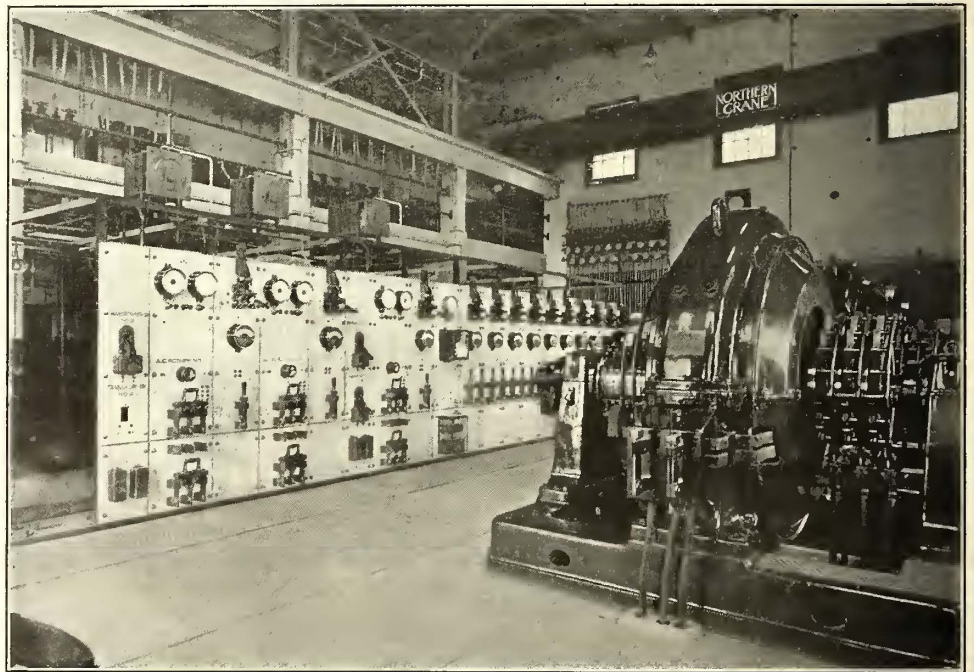
SUBSTATION BUILDING

As the greater portion of the load coming to this new substation was from the Fort Worth Street Railway, it was considered more economical to locate it near the center of the street railway system. In pursuance of this decision, property was purchased just outside the business district of Fort Worth not only large enough for the proposed substation building but with sufficient ground area to admit of a duplication of the proposed installation when it becomes necessary. This site is situated just off the street occupied by the tracks of the interurban lines entering Fort Worth, and a spur track from this main line leads to an alleyway beside the substation building. In case of an emergency, a portable substation may be set on this track and the substation transformers and switchboard equipment used in the operation of the portable station. Provision for a quick connection between the portable and the high-tension bus in the building was made by installing tile bushings in the building wall and a structural steel bracket on the wall exterior to support the wires leading to the portable substation.

The substation building is a brick, steel and concrete structure, 48 ft. 6 in. by 53 ft. 6 in. in plan. As it is situated in an industrial district, the building is quite plain architecturally but is of a substantial fireproof construction. The building walls are 29 ft. 2 in. over all in height and 15 in. thick, which is ample to carry the roof trusses and leave a 22-ft. 10½-in. clear headroom under the lower chords. Provision for an overhead traveling crane of 6-ton

capacity as well as for a gallery for the oil switches and high-tension buses was made by installing structural steel columns in one of the exterior walls and a second row of columns 13 ft. 7 in. from the opposite exterior wall. The overhead crane occupies the 32-ft. 5-in. space over the rotaries, and the gallery is in the 13-ft. 7-in. space between the columns and building wall. The roof and gallery floor are of reinforced concrete 4 in. thick, supported on steel purlins and floor beams. The ground floor is concrete, 6 in. thick, with a sidewalk finish.

A liberal installation of 36-in. globe ventilators and windows assures ample natural illumination and ventilation. Two door openings, 10 ft. wide by 9 ft. high, one at each end of the aisle between the rotary converters and the switchboard, each provided with wrought-iron gates, also sup-



Forth Worth Substation—View of Interior

plement the natural ventilation of the substation building.

Four compartments inclosed on three sides with brick partition walls were built under the oil-switch gallery. This arrangement permitted the four sets of transformers supplying the rotary converters to be installed in separate rooms, thus facilitating repairs or renewals. With the 8-in. brick partition walls separating the transformer sets, when one is disconnected for repairs there is little opportunity for a workman to come in contact with the live high-voltage circuits in the other compartments. To provide for transformer oil leakage and at the same time facilitate the renewal of transformers, each unit is mounted on a truck which spans a concrete pit sufficient in size to hold the oil. The partitions between these oil pits under the transformers serve as foundations for the rails over which the transformer trucks are removed to the substation transfer pit. This transfer pit is just in front of the transformer compartments and extends the full length of the building. It is provided with a truck and running rails so that a transformer may be transferred from its compartment to the large doors at each end of the substation building. A drain from these transformer and transfer pits as well as from the transformers themselves leads to an underground stor-

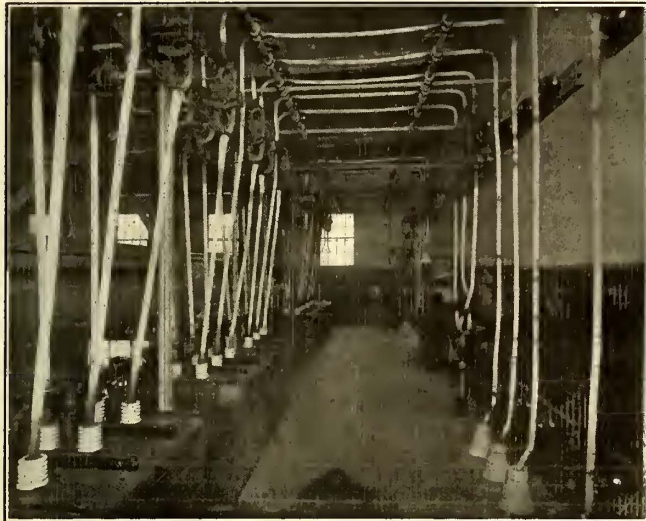
age well outside the building. In case of fire a system of valves controlled from outside the building permits the drainage of any or all transformers to the storage well.

INCOMING TRANSMISSION LINES

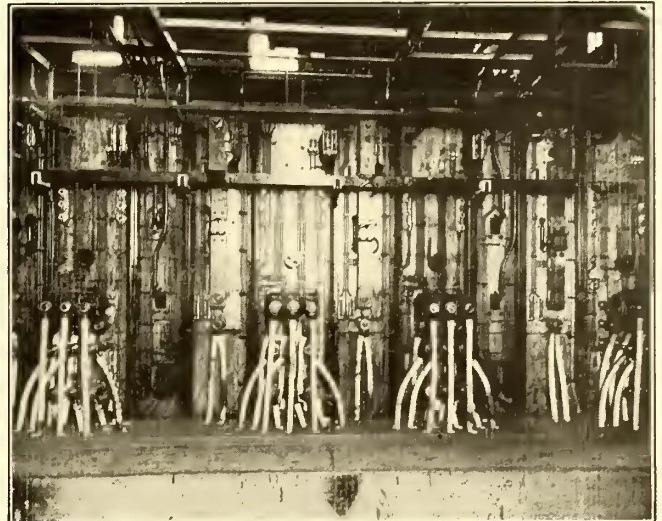
Although nothing in the city ordinances of Fort Worth prohibits the installation of 15,000-volt a.c. overhead transmission lines on the city streets, it was considered more desirable from a civic standpoint to install them underground. The Northern Texas Traction Company's generating sta-

tem two three-phase, 25-cycle, 15,000-volt a.c. lines occupy the two top ducts in ordinary vitrified conduit containing four ducts. The transmission cables are lead-covered and designed for 18,000-volt, three-phase transmission.

The underground cables enter the substation building on the transformer and gallery side and are separated into the three phases in the gallery. These three-phase, 15,000-volt a.c. circuits on leaving the cable pass through a set of disconnecting switches mounted on the building wall and



Fort Worth Substation—Gallery Showing High-Tension Wiring, Incoming Transmission Cables and Oil Switches



Fort Worth Substation—Back of Switchboard at Rotary Converter Panels

tion is situated approximately 7½ miles east of Fort Worth. Two 15,000-volt a.c. three-phase transmission lines lead from this generating station to Fort Worth. Where the interurban line leaves a private right-of-way and occupies the streets, a distance of approximately one mile from the new substation, the two transmission lines enter the underground system by way of pole towers and a terminal building. The pole towers at the terminal building, which is the junction of the overhead lines on the Dallas and the Cle-

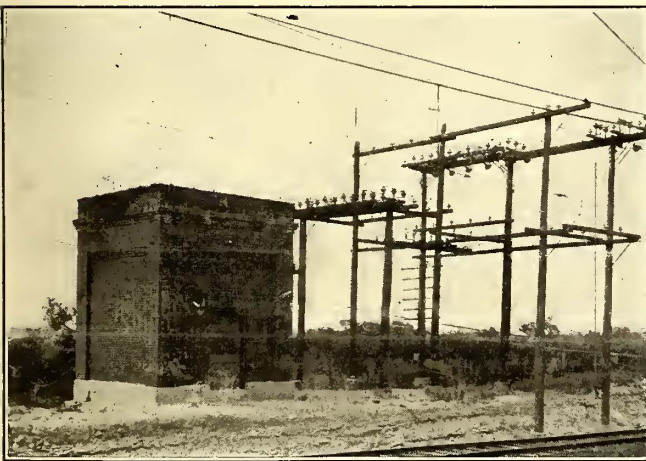
thence overhead and down to the oil switches also on the gallery. From the oil switches an emergency connection is made to a bus line which leads to the tile bushings through the building wall, to which the portable substation may be connected. The other circuit passes to pipe brackets swung from the roof beams, thence to insulators on the building wall and down to the transformers in the compartments on the ground floor. All high-voltage circuits are heavily insulated in addition to being liberally spaced, thus reducing human as well as fire hazard to a minimum.

SUBSTATION EQUIPMENT

As before mentioned, the 750-kw rotaries are each supplied through three 275-kva self-cooled transformers which step down from 15,000 volts to 390 volts a.c. The rotaries are Westinghouse design of the self-starting type, provision having been made, however, for starting if it is found necessary in the future. These starting motors will be mounted on one end of the armature shaft and a speed-limit device is now placed on the opposite end. All leads from the transformers to the rotaries and switchboard are installed in conduit under the substation floor.

The switchboard also was supplied by the Westinghouse Electric & Manufacturing Company and contains twenty-five panels, namely, ten d.c. feeder panels, one totalizing panel, four transformer panels, eight rotary panels and two high-tension line panels. The board is 41 ft. in length by 7 ft. 6 in. high and is so placed as to form a barrier between the transformer compartments and the space occupied by the rotary converters. The marble panels are mounted on a grounded structural-steel frame with struts running to the columns supporting the gallery. Special instruments on the switchboard include a recording ammeter, a recording voltmeter and a total output meter. The field control rheostats are mounted on the struts supporting the switchboard and are remotely controlled through hand wheels installed at the approximate center of each rotary panel.

All lighting circuits are taken off a special 15,000-to-110-volt a.c. lighting transformer, and after passing through a central control cabinet board, they lead to the various lamps through pipe conduit. The lamp fixtures for general



Fort Worth Substation—Pole Tower and Building for Connections to Terminals of Underground Conductors

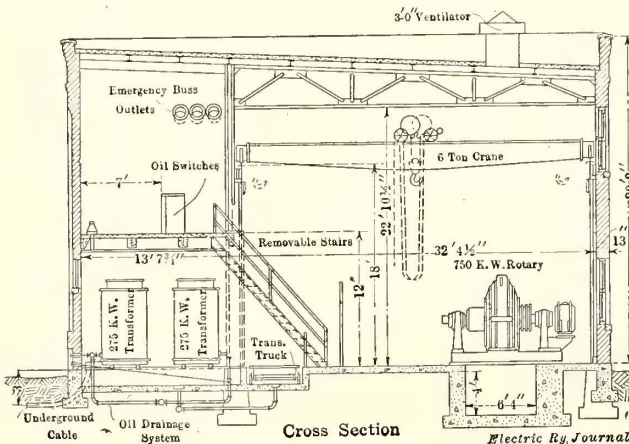
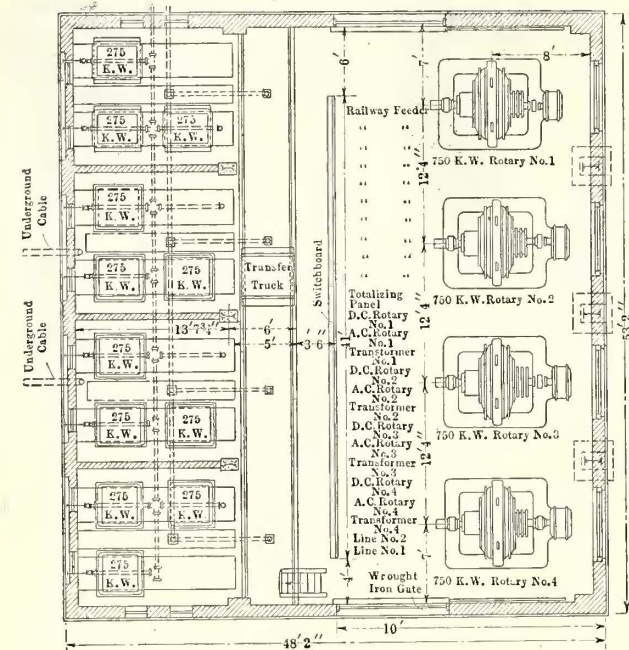
burne interurban lines, are equipped with pole-top switches, making it possible to obtain any desired arrangement of transmission circuits.

The underground terminal building is of brick and steel construction and of sufficient size to house the high-tension disconnecting switches, lightning arrester set and choke coils. A view of the underground terminal building and pole tower construction is shown in the illustration. Leading from the terminal building into the underground sys-

illumination are swung from the roof slab and individual lamps in pipe fixtures are supplied where required.

In addition to the 6-ton overhead bridge crane equipped with a hand-operated trolley for use in maintenance and repairs, a compressed-air system also has been installed. A G.E. type C.P.-28 air compressor set has been placed at one end of the gallery, and a pipe system with taps and hose connections reaches all points in the station where air may be needed in cleaning machines. To keep the electrical

which are now over the boiler are to be placed beside two new 6250-kva, 4000-volt, three-phase, four-wire General Electric turbo-generator sets purchased recently. The new machines will be fitted with directly connected exciters, and in addition a turbine-driven exciter will be installed for break-down service. All turbines, feeder circuits and oil switches will be remotely controlled from a benchboard. The present jet condensing equipment will be supplanted by Worthington surface condensers. Two 500-kw rotary converters now in the plant will be taken out and shipped to synchronous motor-generator sets. The switchboard will be entirely new and all switching apparatus on the board will be installed in duplicate to insure continuity of service. When the plant is completed the entire system will be changed from two-phase, 2200-volt, to three-phase, 4000-volt, four-wire operation. The change in phase will be effected by means of transformers installed on one feeder circuit at a time, and the motors of the customers will either be exchanged or rewound and replaced. Sargent & Lundy, Chicago, Ill., are the engineers for the redesign of the station.



Fort Worth Substation—Plan and Cross-Section

engineer advised of the amount of current in the cable sheaths of the underground system, a Westinghouse Model 80 voltmeter has been installed between it and the ground. Daily readings of this instrument are taken and recorded. Any electrolytic action on the cable sheaths may be noted from the difference in potential and proper precautions taken before a serious breakdown occurs.

PASSING OF THE "DOUBLE-DECK" STATION AT FORT WAYNE, IND.

The electrical energy for the operation of the Fort Wayne & Northern Indiana Traction Company lines has been generated in what is known as a "double-deck" station at Fort Wayne, Ind., but in the course of work of rehabilitation at Fort Wayne this double-deck feature will be done away with. The excavation and the concrete work for the 40-ft. by 100-ft. addition to the front of the building are under way. In the completed plant all turbines will be set on the ground floor. The two twenty-five-cycle machines

CO-OPERATION TO PROMOTE A GREATER ELECTRICAL INDUSTRY

A meeting of a number of the active leaders in the electrical industry, called for the purpose of promoting co-operation for the benefit of the consumer as well as the manufacturer, was held at Association Island, Lake Ontario, Sept. 3 to 6. Joseph B. McCall, of Philadelphia, president of the National Electric Light Association, presided over the sessions, and addresses were made by Samuel Insull, president Commonwealth Edison Company of Chicago; Dr. C. P. Steinmetz, General Electric Company; Frank A. Vanderlip, president of the National City Bank of New York; John H. Roemer, chairman of the Railroad Commission of Wisconsin; J. M. Wakeman, general manager of the Society for Electrical Development, Inc., and others.

MR. INSULL ON THE FUTURE OF ELECTRICITY.

Mr. Insull took as his subject the "Distribution of Electric Energy, Present and Future." He said that the problem of transmission of energy was perhaps of more importance than transportation. In the early days of electrical energy production, when steam was the source of energy, electricity was utilized largely for light, motor service being a by-product. To-day the conditions were reversed, and in many of the large systems electric light was a by-product and motor service was the chief source of income.

Mr. Insull expressed the opinion that the central station should produce energy for all transportation and industrial purposes as well as for lighting. The production and distribution of energy for all purposes should be under the control of one organization, even if it must become a public rather than a private enterprise.

Energy could now be produced in a large station so economically and at such low cost that it could be distributed more economically than it could be produced locally. On account of the low load-factor the lighting load represented the poorest business a central station could obtain. However, it must supply energy for lighting as an obligation to the public rather than from the point of view of income. Taken in connection with the motor load it could be handled profitably, but it was a very poor load when considered alone.

Discussing the future of energy distribution, Mr. Insull remarked that agitation with reference to the conservation of fuel would force the concentration of production of electrical energy. The concentration movement would also be forwarded by the limitations in finance, the trouble in financing small systems being much larger than that in combined

large systems. Just as the country had found it desirable to combine its railroads into great trunk-line systems, so it would be found desirable to consolidate electrical transmission systems into networks supplying energy for all purposes. Concentration of production represented the solution of great industrial problems in that it meant low cost of production, low cost of transmission and a minimum selling price to the community.

FUTURE TECHNICAL DEVELOPMENT

Dr. Steinmetz said that the limit in size of steam turbines and turbo-generator apparatus had not been reached, and that units reaching much more than 30,000 hp would be built when a demand arose for such equipments. Although transmission systems had covered distances greater than 200 miles and areas as large as 20,000 sq. miles and were operating at electromotive forces as high as 150,000 volts, the limit had not been reached in either length of circuit, transmission area covered or voltage utilized.

Applications had been made of the electric motor in transportation only for local work, there being as yet no long-distance railways operated electrically. However, local electric railway service had been developed to such an extent that these railways consumed at present more power than would be required for operating all of the steam trains electrically. The development of local electric railway service had brought about a revolution not only in domestic life but also in industrial activity. Factories could now be located at the most economical sites from the point of view of operation and the workmen could select sites for their homes within a wide radius, from the point of view of convenience in domestic arrangements and comfort.

As compared with other forms of energy electricity was superior in three important characteristics relating to transmission, conversion and concentration. Electrical energy could be produced most economically at one place and transmitted efficiently to be utilized just when and where wanted without regard to the location of the source of supply of coal or water. Chemical energy could also be transmitted in the form of fuel, but not so economically as can electrical energy.

With reference to the utilization of electrical energy, Dr. Steinmetz said that it was not necessary to-day to discuss the possibilities but that merely the economical features should be considered. The question was not whether such a thing could be done electrically, but whether it could be done electrically more economically than by some other method. In many cases, such as the substitution of electricity for steam, marked economies could be obtained by revising the system to meet changes in the conditions brought about by the utilization of electricity. The problem involved reorganization to accommodate electrical service. For example, when electricity was substituted for steam for transportation, the electrical trains need not be duplicates of the steam trains. Better results could be obtained by utilizing a larger number of trains of shorter length. This change represented an improvement not only in service to the public but also in the load on the system.

REGULATION IN WISCONSIN

Mr. Roemer described the theory of regulation which is embodied in the Wisconsin law and the practices of the commission. In the course of his address he said that the commission had never established and did not intend to establish any fixed rate of return. In conclusion he said:

"No regulation can be effective which is not based upon accurate information and which is not actuated by a sense of justice and equity. In the light of the past, it must be conceded that an independent tribunal, free from local influences and prejudices and assisted by a corps of trained experts, is better qualified to regulate efficiently public service corporations and individuals engaged in public services than any municipal council or local tribunal. In few instances would it be possible for municipalities to maintain the necessary organization of competent assistants to deal

intelligently with the problems involved in the regulation of public utilities. The cost of such an organization would be prohibitive to most municipalities. In central control there is therefore not only efficiency but also economy. One body can serve all municipalities as well as one municipality and serve them better.

"After five years of administration of the Wisconsin law, the results obtained from its operation have been generally satisfactory. Our experience indicates that a comprehensive system of regulation such as is provided by our law is not only advantageous to the general interests of the public but as well to the business interests of utilities."

ELECTRICAL CAPITAL REQUIREMENTS

Mr. Vanderlip said that the capital requirements of central stations in the last five years had been \$900,000,000, or an average of \$180,000,000 a year.

"When we think what is certain to be done in the way of electrification of steam railroad terminals and heavy mountain grades," he added, "when we reflect on the larger use of electrical energy for industrial power, in agricultural uses, and in the continued growth of necessary interurban lines, we need to look no further into the possible development of the industry to see a requirement for \$400,000,000 a year of new capital. That means a new capital issue of \$8,000,000 every week for the next five years.

"Four out of five investors at the present time have their minds closed against any investment in securities of electrical corporations, and that is true largely because they fear the effect of present political conditions and tendencies.

"The time has now come, in my opinion, when no man with capital to invest in corporate securities, if he has a desire for return that is any larger than government obligations will pay, can longer hold back from the study of public utility investments. The experimental inventive stage is past. The business has a background that has now become broad enough so that one can make valuable comparisons and sound deductions. It has ceased to be a business of only small units, and the tendency is markedly in the direction of great capital issues which shall have at all times a broad market. The dangers from a prejudiced, unwise or unfair vote of a municipality or a board of aldermen are being greatly lessened by the newly organized public service commissions, and these same bodies, recognizing the monopoly character of the business, are guarding it from useless and venal competition, as they are also guarding the investor from too free capital issues by the optimistic developer or the enthusiastic promoter.

"I can see that, with a little more time for investors to become convinced that a public service corporation is not another name for a target against which to level unfair state and municipal enactments, we may have four out of five investors buying such securities, rather than refraining from doing so.

"In the mind of the investor, the outlook for fair public treatment of public service corporations is the most important single factor in directing investment of capital toward or away from the electrical field.

"I firmly believe that this matter of fair public treatment lies largely in your own hands. If you will do as well with that as you are doing with the technical side of the business the \$400,000,000 a year of fresh capital which you need will be forthcoming."

SOCIETY FOR ELECTRICAL DEVELOPMENT, INC.

Mr. Wakeman, outlined the plans of the Society for Electrical Development, Inc. The campaigns of this society will include the publication of articles in popular magazines showing the proper applications of electricity. These articles will be written to appeal to the general public. In the trade press use will be made of articles prepared by men identified in each case with the industry which the paper represents. Articles will be prepared for the daily newspapers in order to present the truth concerning electrical devices, public utilities and corporations.

The New York City Brake Order

The Public Service Commission, First District, New York, Required That All Passenger Cars Weighing More Than 25,100 lb. Be Equipped with Air Brakes—Tests Conducted by One of the Companies Justified This Order in the Opinion of the Commission, and Its Course Has Been Upheld by the Supreme Court, Appellate Division—The Article Is Followed by a Reply from Mr. Fowler, Who Conducted the Tests for the Company and Disagrees with the Conclusions Reached

BY J. N. DODD, ENGINEER PUBLIC SERVICE COMMISSION, FIRST DISTRICT

On July 10 the Supreme Court, Appellate Division, handed down a decision sustaining the action of the Public Service Commission, First District, New York, in ordering all companies operating surface cars in Greater New York to equip certain of their cars with power brakes. This decision closes a long and interesting proceeding.

In the Public Service Commission act of 1907, creating the commissions and defining their duties, it was specified (Sec. 53) that if, in the judgment of the commission having jurisdiction, improvements to or changes in any property or device used by any street railroad corporation ought reasonably to be made in order to promote the security of the public, the commission shall after a hearing make and serve an order directing such improvements or changes to be made.

In conformity with its duties under this section, the commission for the first district at an early date took up for consideration the adequacy of the brakes with which the surface cars in New York are equipped.

As the weight of a car and the corresponding difficulty of control increase, the weight eventually reaches a figure at which air or other power is necessary to operate the brakes.

PREVIOUS TESTS

At first glance it seems reasonable to suppose that exhaustive tests had been made by some authority to determine the maximum weight of cars which may be operated safely with a hand brake. A long search failed to reveal any such series of tests. When comparative tests had been made by any company or other authority, most of the cars tested were of the same weight. No thorough, exhaustive test apparently had been made for the purpose of determining the limiting weight of cars which may be safely operated with hand brakes. Moreover, when available records of various tests were examined, they were found to be contradictory and inconsistent. For example, the tests by the New York Railroad Commission in 1899 on cars weighing about 20,000 lb. showed hand brakes better than air brakes at almost all speeds. On the other hand, tests on the Hanover street railways, reported to the International Street and Interurban Railway Congress, Munich, 1908, on cars of about the same weight showed air brakes far superior at all speeds.

In the course of this search it became apparent that tests do not always furnish a reliable criterion of the relative value of different brakes. They merely state the stopping distance of the car under the particular conditions that obtained at the time of the test. Most of the conditions that affect this distance vary widely. Among these varying conditions may be mentioned the brakeshoe adjustment, the weight of the car, the condition of the rail, and the human element. Most of these factors vary widely also during the course of the day, and each of them may change independently of any of the others. Thus, on account of the wear of the brakeshoes, the brake adjustment may change materially even in the course of a single trip. The weight of the car is continually changing, owing to the varying number of passengers. The condition of the rail may alter entirely in the course of a few seconds. This change is often such that a visual inspection of the rail

fails to reveal its quality. Thus, a wet rail may provide an ideal surface for stopping a car quickly, or it may offer the reverse. In the same way, though not to the same extent, the distance in which a car may be stopped on a dry rail varies according to whether the rail is clean or covered with dust or dirt. For this reason it is impossible to be sure that the rail conditions are the same in tests on two different brakes or that the rail conditions at the time of the test correctly represent average rail conditions under which the car must operate throughout the year.

The human element also is extremely variable. In actual service there are many strong motormen and many who are physically weak, many who are intelligent and mentally alert and many the reverse, many in fresh physical and mental condition and many tired from a day's work.

During most tests the motorman usually knows that he is soon to receive the stopping signal and, knowing what he is expected to do, is intent upon doing that thing in the most efficient manner. During such tests, also, the streets are usually bare of traffic and the motorman's attention is not distracted by other duties such as making up lost time, keeping a lookout to pick up passengers and obeying the conductor's signals. Usually a picked motorman is chosen, selected for his general intelligence and interest in his work. The motorman is generally in fresh physical condition and therefore in good mental condition and to that extent capable of responding to any demands made upon him. The results obtained in service at the close of a long wearying day's work would be entirely different from the results obtained in any series of tests. It is impossible to devise any series of tests under conditions which even approximate the average conditions existing in actual service because it is impossible to tell what the average of these varying factors may be.

Hence it is not wise to place too great reliance upon tests as a method to determine the type of brake which must be used on any type of car.

GENERAL PRACTICE IN REGARD TO BRAKES

The United States Census reports for 1902 and 1907 on the cars for city service give the following figures:

	Total Number Cars	Number Equipped with Air Brakes	Per Cent Equipped with Air Brakes
1902	66,784	7,905	11.8
1907	83,641	31,684	37.8
Increase	16,857	23,779	

According to these figures practically all new cars purchased during this period were equipped with air brakes and many of the old cars had air brakes added.

On the other hand, although these facts show the growing esteem in which the air brake is held throughout the country, they give no indication of the weight of cars so equipped.

More definite information is obtained from a study of the braking practice observed in various cities. It appears that all cars are operated with power brakes in the cities of Cleveland, Detroit, Los Angeles, Milwaukee, Minneapolis, St. Paul and St. Louis. In addition to these cities all double-track cars are equipped with power brakes in

Chicago, Cincinnati, Indianapolis, Louisville, Omaha, Seattle and in the State of New Hampshire. In the city of Denver all new cars purchased by the company are equipped with air brakes and practically all the old ones are so equipped.

This evidence is important as showing the opinion on this subject of managers and municipal authorities over the country.

DATA COMPILED BY THE COMMISSION

The New York law requires all street railroad companies under jurisdiction of the Public Service Commissions to report all accidents which occur on their lines. A study was made of these accidents in the First District by the commission of that district to determine what evidence could be obtained from them bearing on the subject.

From the accidents so reported for the years 1909 and 1910 all those caused by the front end of a moving car were selected. These accidents were listed according to the weight of the car. By means of the average number of cars of each weight operated throughout the year, the figure representing the total number of such accidents listed under each weight of car was reduced to the number of accidents per 100 cars.

The maximum weight of single-truck cars is about 20,000 lb. The weight of double-truck hand-brake cars used in

TABLE I—ACCIDENTS TO SURFACE CARS REPORTED TO PUBLIC SERVICE COMMISSION, FIRST DISTRICT, DURING 1909 AND 1910

	1909	1910	Both Years
Hand-brake single-truck cars, weight 16,000-20,000 lb.:			
Number of accidents.....	55	111	166
Number of cars.....	875	765	820
Accidents per 100 cars.....	6.3	14.5	20.2
Hand-brake double-truck cars, weight 20,100-25,000 lb.:			
Number of accidents.....	20	42	62
Number of cars.....	281	281	281
Accidents per 100 cars.....	7.1	15	22
Hand-brake double-truck cars, weight 25,100-40,000 lb.:			
Number of accidents.....	239	412	651
Number of cars.....	2018	2001	2010
Accidents per 100 cars.....	11.9	20.6	32.4
Air-brake double-truck cars, weight 25,000-40,000 lb.:			
Number of accidents.....	50	162	212
Number of cars.....	723	959	841
Accidents per 100 cars.....	6.9	16.9	25.2
Air-brake double-truck cars, weight 40,000 lb. and up:			
Number of accidents.....	93	94	187
Number of cars.....	695	704	699
Accidents per 100 cars.....	13.4	13.3	26.8

New York City varied from 20,000 lb. to about 40,000 lb. The weight of air-brake cars varies from about 25,000 lb. to about 50,000 lb. The list of accidents reported for the various weights of cars is given in Table I printed in this column.

The value of such a list lies in great part in the fact that it deals with large numbers. A large number of cars will usually be operated under average conditions. A small number of cars may be and often is operated under special conditions. For example a small number of cars may be operated in a very congested territory or the reverse, or the daily mileage may be exceptionally large or small. Such criticisms do not usually hold when large numbers are dealt with.

The list in Table I indicates the following conclusions:

(1) On single-truck cars weighing not more than 20,000 lb. hand brakes are satisfactory, and no improvement could be obtained by the use of air brakes.

(2) On double-truck cars weighing not more than 25,000 lb. the evidence is inconclusive. Although the number of accidents per 100 cars is small, the number of cars is small so that the record lacks weight.

(3) Cars weighing from 25,000 lb. to 40,000 lb. equipped with hand brakes were involved in about 30 per cent more accidents than were an equal number of cars of the same weight equipped with air brakes.

An examination was also made of the number of accidents reported on cars weighing from 25,000 lb. to 30,000 lb. In this class there were a great many cars and the

record showed even more strongly in favor of air brakes than did the record of the larger class, including cars weighing from 25,000 lb. to 40,000 lb.

A more accurate criterion would have been a comparison on a mileage basis—that is, a record of the accidents, say, per 1000 miles—but the mileage of the various cars was not furnished to the commission and such a comparison was impossible. However, the comparison on a car basis, as it was made out, is probably much more favorable to hand brakes than would be a comparison on a mileage basis. Air-brake cars being newer are more popular with the traveling public than are hand-brake cars. It is well known that with the same motor equipment the schedule speed of an air-brake car is higher than that of a hand-brake car. Air-brake cars are in much greater favor with the motormen because of their ease of operation. The power consumption of air-brake cars is considerably less than that of hand-brake cars on account of the fact that with hand-brake cars motormen usually operate with the brake partially applied so as to be able to stop the car quickly when necessary, while with the air-brake they run free. For all these reasons it appears probable that for cars of the same weight the mileage of cars equipped with air brakes is much greater than that of an equal number of cars equipped with hand brakes. It therefore follows that a record of accidents on a mileage basis would be much more favorable to air brakes than the record given above.

HISTORY OF HEARING

On July 7, 1911, a hearing on the subject was called by the commission for July 20, 1911. The various companies in the city interested were notified of the hearing and were represented by counsel. The hearings lasted until Sept. 20, 1911. The arguments of the companies were principally in favor of a dividing line higher than 25,000 lb. They are perhaps best summarized by quoting from the opinion of the presiding commissioner, rendered Oct. 11, 1911:

"The inquiry developed a great difference of opinion as to the cause of accidents and the efficiency of different types of brakes. The only real contention at the hearing was as to where the dividing line should be drawn in respect to weight. It appeared that the cars were chiefly of the double-truck type and varied in weight from about 22,000 lb. to 50,000 lb. The transportation engineer of the commission testified that single-truck cars could be safely operated with improved hand brakes, and also the lighter type of double-truck cars. He was of the opinion, however, that no cars should be operated with what is known as the 'staff and chain brake' except the very light cars.

"This dividing line, as suggested in the hearing order, and one recommended by the transportation engineer, was double-truck cars weighing over 25,000 lb. It appeared that some of the companies have a considerable number of cars that are only slightly in excess of this weight, one class of cars weighing 25,100 lb. These companies thought that 26,000 lb. should be the dividing line. Other companies had cars varying in weight from 26,000 lb. to 28,000 lb. or 29,000 lb., and they thought that the dividing line should be 30,000 lb. It was not claimed by anyone that cars weighing 30,000 lb. or over did not require power brakes. In fact, it appeared that most of the cars of that weight are already so equipped.

"It was suggested in behalf of one of the companies that a distinction should be made between closed and open cars, there being a large number of open cars weighing in the neighborhood of 26,000 lb. or 27,000 lb., which are operated only in the summer time, when the rail is dry and the brakes operate more efficiently. On the other hand, one witness, called by one of the companies, testified that the rail was safer in the winter time than it was in the summer time. It also appeared that open cars have greater seating capacity, and so, when loaded, are heavier than the closed cars of corresponding weight."

His recommendations follow:
 "I am of the opinion that hereafter all new cars put into service within the city of New York weighing over 25,100 lb. should be equipped with power brakes, and that, as to the present equipment, a reasonable time should be given for the companies to make the necessary change.
 "I recommend, therefore:

"(1) That all double-truck passenger surface cars in service weighing over 27,000 lb. should be equipped with power brakes and geared hand brakes on or before June 1, 1912. This will give the companies an opportunity during the next six months to equip with power brakes all of their open cars weighing 27,000 lb. and upward, and also their closed cars during the summer of 1912 which will be required to go into service in the autumn;
 "(2) That all double-truck passenger surface cars in service weighing over 25,100 lb. should be equipped with power brakes and geared hand brakes on or before June 1, 1913;
 "(3) That all double-truck passenger cars weighing 25,100 lb. or less should be equipped with geared hand brakes on or before June 1, 1912; and

TABLE II—No. 400 SERIES. BRAKING DISTANCES, VARIOUS LOADS AND SPEEDS. DRY RAIL

Car No.	432	432	432	432	432	454	454	454	448	441	422	432	453
Brakes	Air, 85%	Air, 85%	Air, 90%	Air, 95%	Air, 100%	"A"	"A"	"A"	"B"	"C"	"D"	"E"	"E"
	No sand	No sand	Sand	No sand	Sand	No sand	No sand	Sand	No sand	No sand	No sand	No sand	No sand
Empty car:													
Date	12/19/11	4/6/12	4/6/12	4/7/12	4/7/12	1/26/12	4/12/12	4/12/12	1/1/12	1/4/12	30/11	25/11	29/11
Weight, lb.	30,300	30,300	30,300	30,300	30,300	28,760	28,760	28,760	28,200	28,500	28,200	30,300	28,000
Distance:													
5 M.P.H.	4' 6"	7' 4"	7' 3"	6' 3"	6' 3"	5' 5"	6' 6"	6' 1"	5' 9"	3' 6"	5' 4"	4' 8"	3' 8"
10 M.P.H.	18' 11"	26' 11"	25' 8"	25' 0"	21' 9"	25' 3"	22' 11"	22' 5"	23' 1"	18' 3"	25' 3"	24' 10"	18' 10"
15 M.P.H.	48' 10"	57' 4"	53' 2"	54' 1"	53' 9"	56' 10"	49' 0"	53' 3"	46' 5"	44' 1"	52' 6"	52' 0"	44' 4"
20 M.P.H.	85' 1"	99' 8"	103' 5"	95' 6"	90' 2"	97' 7"	88' 3"	88' 0"	91' 3"	81' 6"	95' 2"	98' 8"	82' 10"
Seated load:													
Date	12/17/11	4/8/12	4/8/12	4/8/12	4/7/12	1/25/12	4/12/12	4/12/12	1/1/12	1/2/12	30/11	28/11	29/11
Weight, lb.	40,100	40,100	40,100	40,100	40,100	38,500	38,500	38,500	38,000	38,300	37,900	40,100	37,800
Distance:													
5 M.P.H.	7' 2"	6' 2"	7' 3"	5' 10"	6' 0"	5' 1"	6' 2"	6' 3"	6' 9"	6' 1"	7' 9"	6' 10"	5' 6"
10 M.P.H.	29' 9"	25' 1"	22' 8"	23' 6"	22' 8"	21' 9"	21' 7"	27' 6"	24' 10"	24' 0"	26' 3"	26' 6"	25' 6"
15 M.P.H.	63' 3"	55' 11"	49' 9"	52' 10"	51' 1"	50' 7"	47' 8"	58' 7"	55' 6"	51' 3"	60' 10"	57' 0"	54' 4"
20 M.P.H.	108' 6"	102' 3"	94' 4"	89' 1"	89' 3"	89' 1"	86' 6"	102' 9"	104' 4"	99' 5"	107' 9"	108' 1"	106' 2"
Standing load:													
Date	12/18/11	4/11/12	4/11/12	4/8/12	4/11/12	1/26/12	4/12/12	4/12/12	1/1/12	1/2/12	30/11	28/11	29/11
Weight, lb.	45,300	45,300	45,300	45,300	45,300	43,700	43,700	43,700	43,200	43,500	43,100	45,300	43,000
Distance:													
5 M.P.H.	6' 7"	6' 1"	6' 10"	6' 8"	7' 1"	6' 0"	6' 2"	6' 4"	6' 4"	5' 8"	7' 5"	7' 5"	7' 11"
10 M.P.H.	26' 3"	26' 3"	24' 6"	23' 11"	25' 9"	23' 1"	23' 7"	24' 11"	24' 4"	23' 9"	29' 6"	28' 0"	32' 3"
15 M.P.H.	65' 11"	56' 3"	55' 6"	55' 8"	55' 5"	53' 5"	50' 1"	58' 9"	55' 9"	55' 2"	62' 10"	62' 9"	69' 0"
20 M.P.H.	108' 7"	117' 5"	105' 10"	101' 3"	102' 1"	97' 9"	96' 7"	104' 7"	102' 0"	105' 1"	112' 10"	116' 8"	129' 10"

NOTE.—Brakes "A," "B," "C," "D" and "E" are hand brakes.

TABLE III—No. 2700 SERIES. SEMI-CONVERTIBLE CARS. BRAKING DISTANCES, VARIOUS LOADS AND SPEEDS. DRY RAIL

Car number	2720				2721				2722				2723											
Brake	Air, 85%		"D"		Air, 85%		"C"		Air, 85 per cent		"B"		Air, 85 per cent		Air, 90 per cent		Air, 95 per cent		Air, 100 per cent		"A"			
	No sand	No sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand	No sand	Sand		
Empty car:																								
Date	1/20/12		1/21/12		3/19/12		3/19/12		4/5/12		4/4/12		3/27/12		3/30/12		3/30/12		3/27/12		4/24/12		4/21/12	
Weight, lb.	31,300		31,300		31,500		31,500		31,200		31,200		31,400		31,400		31,400		31,400		31,400		31,400	
Distance:																								
5 M.P.H.	7' 5"	8' 6"	7' 8"	7' 3"	7' 11"	..	7' 10"	6' 6"	6' 11"	..	8' 5"	..	5' 9"	6' 0"	5' 0"	5' 8"	5' 10"	6' 4"	8' 10"	9' 4"	6' 6"	7' 6"		
10 M.P.H.	30' 8"	31' 11"	27' 2"	27' 11"	33' 0"	..	24' 4"	24' 3"	25' 6"	..	29' 2"	..	23' 8"	23' 11"	22' 10"	23' 5"	28' 7"	24' 0"	29' 8"	29' 2"	28' 4"	26' 11"		
15 M.P.H.	62' 7"	70' 3"	61' 7"	59' 11"	66' 5"	64' 9"	57' 11"	53' 2"	57' 8"	57' 4"	57' 1"	..	59' 7"	49' 2"	46' 9"	49' 0"	52' 0"	49' 3"	63' 0"	58' 8"	64' 5"	57' 8"		
20 M.P.H.	109' 0"	118' 2"	108' 3"	103' 10"	110' 2"	119' 7"	93' 11"	91' 9"	98' 9"	100' 7"	111' 11"	92' 8"	96' 1"	88' 8"	92' 9"	86' 4"	96' 9"	87' 4"	102' 10"	99' 0"	115' 2"	106' 11"		
Seated load:																								
Date	1/20/12		1/21/12		3/19/12		3/19/12		4/5/12		4/4/12		3/27/12		3/30/12		3/30/12		3/27/12		4/24/12		4/21/12	
Weight, lb.	36,700		36,700		37,000		37,000		36,600		36,600		36,800		36,800		36,800		36,800		36,700		36,700	
Distance:																								
5 M.P.H.	7' 3"	8' 0"	9' 5"	9' 6"	9' 10"	..	8' 5"	7' 8"	8' 3"	..	6' 6"	7' 3"	7' 5"	7' 4"	6' 6"	6' 8"	6' 11"	6' 6"	10' 1"	10' 0"	9' 3"	8' 3"		
10 M.P.H.	23' 10"	31' 6"	33' 5"	33' 1"	35' 1"	..	29' 6"	28' 3"	30' 9"	..	28' 8"	24' 7"	28' 2"	25' 10"	29' 1"	23' 10"	26' 6"	23' 0"	32' 7"	30' 6"	32' 0"	29' 1"		
15 M.P.H.	58' 3"	66' 0"	71' 5"	71' 3"	84' 0"	75' 11"	60' 0"	61' 8"	66' 9"	60' 9"	59' 3"	52' 4"	64' 11"	53' 10"	53' 2"	50' 5"	56' 7"	52' 1"	65' 8"	64' 0"	66' 9"	65' 3"		
20 M.P.H.	120' 10"	137' 5"	121' 10"	121' 1"	127' 8"	139' 4"	108' 6"	104' 9"	110' 10"	109' 0"	104' 11"	98' 0"	111' 5"	97' 10"	103' 7"	95' 4"	105' 8"	92' 7"	116' 4"	112' 7"	116' 10"	118' 9"		
Standing load:																								
Date	1/21/12		2/12/12		2/12/12		4/5/12		4/5/12		3/26/12		3/26/12		3/26/12		3/26/12		3/27/12		4/21/12		4/21/12	
Weight, lb.	43,300		43,500		43,500		43,200		43,200		43,400		43,400		43,400		43,400		43,400		43,400		43,400	
Distance:																								
5 M.P.H.	8' 10"	9' 5"	10' 8"	..	10' 5"	..	10' 0"	9' 10"	10' 11"	..	7' 3"	8' 6"	6' 4"	5' 9"	8' 0"	8' 6"	8' 1"	8' 0"	11' 7"	10' 7"	9' 4"	9' 2"		
10 M.P.H.	33' 0"	34' 1"	35' 8"	..	34' 7"	..	34' 11"	32' 0"	36' 9"	..	31' 1"	24' 10"	25' 1"	22' 8"	31' 4"	26' 1"	26' 7"	29' 2"	34' 9"	32' 10"	32' 5"	33' 6"		
15 M.P.H.	73' 0"	92' 0"	67' 6"	..	77' 2"	..	73' 5"	64' 6"	91' 0"	81' 1"	65' 4"	55' 9"	64' 2"	53' 3"	66' 6"	56' 8"	66' 11"	57' 1"	70' 10"	71' 4"	70' 6"	72' 11"		
20 M.P.H.	127' 3"	162' 10"	120' 5"	..	133' 3"	..	138' 9"	136' 10"	144' 11"	165' 10"	110' 0"	119' 2"	104' 4"	110' 6"	114' 2"	107' 5"	122' 9"	109' 8"	127' 4"	128' 8"	136' 5"	128' 0"		

NOTE.—Brakes "B," "C" and "D" are hand brakes.

"(4) That all cars other than passenger cars should be equipped with power brakes and geared hand brakes on or before June 1, 1912."

A ruling was made by the commission according to the recommendation.

The company most affected by this order was the Brooklyn Rapid Transit. This company owned 1125 cars on which both air brakes and geared hand brakes must be provided according to the order. As estimated by it, the cost of equipping its cars as directed in the order was \$560,000. This included an allowance for the loss of service of the car while it was being equipped with brakes.

REHEARING

On Oct. 31, 1911, the Brooklyn Rapid Transit applied for a rehearing. This was granted by the commission on Nov. 14, 1911. The rehearing was requested on broad grounds.

In order to learn more of the operation of brakes the companies engaged the services of a well-known consulting engineer to make a series of tests on the relative stopping distances that could be obtained with air brakes and various makes of hand brakes.

The series included tests of five different makes of hand brakes and air brakes adjusted to four different ratios or pressures, three different weights of cars, tests on wet and on dry rail and tests with and without sand. In most

test of the brake. Such a method of braking requires an entirely different procedure in an emergency from that employed in ordinary "service" braking. Consequently it is probable that the results obtained in these tests by this means of braking were superior to what would be obtained in actual operation, inasmuch as in the tests the motorman knew in advance that he was to stop the car in a certain manner. It also appeared that although reversing the motors often gave better results than stopping by means of the brake, these instances were usually at low speeds. At high speeds reverse stops usually gave poorer results than brake stops, and at these speeds the superiority of the brake stops was much more marked than the superiority of the motor stops at low speeds. For these reasons the reverse stops were eliminated from consideration and attention was kept to the brake stops.

For the purposes of the hearing the object of the tests was to determine what brake would stop a car in the shortest distance in order to avoid an accident. For this reason the "service" stop was not considered, the brakes being considered solely on an "emergency" basis.

Since the purpose of the tests was to determine the action of the brake in its operation throughout the year, individual stops were disregarded and the average length of stops was the only figure considered.

TABLE IV—No. 2500 SERIES SEMI-CONVERTIBLE CARS. BRAKING DISTANCES, VARIOUS LOADS AND SPEEDS. DRY RAIL.

Car number.....	2500		2500		2500		2500		2501		2584	
	Air, 85 per cent	Sand	Air, 90 per cent	Sand	Air, 95 per cent	Sand	Air, 100 per cent	Sand	No sand	Sand	No sand	Sand
Empty car:												
Date	3/11/12		3/14/12		3/11/12		3/14/12		2/29/12		3/31/12	
Weight, lb.....	38,300		38,300		38,300		38,300		36,600		36,600	
Distance:												
5 M.P.H.	5' 4"	6' 4"	5' 4"	5' 5"	4' 11"	5' 0"	5' 8"	5' 4"	4' 9"	..	5' 0"	4' 7"
10 M.P.H.	13' 10"	19' 7"	19' 6"	18' 11"	18' 11"	18' 10"	19' 11"	19' 8"	23' 4"	..	20' 10"	20' 10"
15 M.P.H.	41' 2"	42' 11"	43' 1"	40' 6"	41' 10"	40' 5"	40' 4"	41' 6"	45' 9"	47' 6"	48' 4"	44' 5"
20 M.P.H.	74' 6"	80' 3"	66' 11"	75' 4"	73' 2"	77' 10"	74' 7"	76' 6"	82' 6"	86' 2"	82' 5"	87' 10"
Seated load:												
Date	3/14/12		3/14/12		3/16/12		3/16/12		2/29/12		4/1/12	
Weight, lb.....	43,800		43,800		43,800		43,800		41,800		42,000	
Distance:												
5 M.P.H.	6' 8"	6' 10"	5' 2"	5' 5"	5' 9"	6' 1"	4' 7"	5' 1"	5' 4"	..	6' 9"	5' 11"
10 M.P.H.	22' 6"	24' 0"	20' 0"	19' 8"	22' 10"	22' 9"	18' 9"	21' 8"	22' 6"	..	22' 10"	22' 6"
15 M.P.H.	47' 10"	49' 8"	46' 5"	46' 1"	49' 5"	52' 1"	43' 0"	45' 2"	48' 1"	45' 1"	50' 9"	47' 6"
20 M.P.H.	87' 2"	91' 1"	81' 0"	83' 0"	84' 3"	91' 6"	80' 10"	80' 5"	84' 4"	79' 11"	88' 6"	87' 10"
Standing load:												
Date	3/17/12		3/17/12		3/17/12		3/17/12		2/29/12		4/1/12	
Weight, lb.....	50,400		50,400		50,400		50,400		48,600		48,600	
Distance:												
5 M.P.H.	8' 4"	7' 7"	8' 3"	6' 9"	6' 8"	6' 1"	6' 5"	6' 4"	5' 4"	..	6' 6"	6' 9"
10 M.P.H.	28' 0"	32' 5"	24' 9"	25' 0"	22' 0"	25' 11"	21' 8"	22' 0"	24' 3"	..	24' 8"	24' 10"
15 M.P.H.	61' 9"	67' 8"	55' 5"	54' 7"	51' 5"	54' 3"	47' 8"	48' 0"	51' 7"	52' 1"	51' 2"	53' 4"
20 M.P.H.	107' 0"	116' 8"	100' 9"	107' 10"	92' 3"	98' 6"	83' 11"	92' 6"	94' 6"	91' 10"	93' 5"	94' 6"

NOTE.—Brakes "A" and "E" are hand brakes.

cases the car was stopped by means of the brake and also by reversing the motors. With the air brake the car was stopped by the "service" application and by the "emergency" application. Tests were made on an empty car, on a car loaded with sand to represent a seated load and on a car loaded to represent a standing load. The car was stopped when running at 5, 10, 15 and 20 m.p.h. Three stops were made at each speed and load, making thirty-six stops for each complete test on any brake and method of braking.

From these tests an enormous number of data were obtained. For the sake of simplicity it was necessary to eliminate from consideration as many as were not essential or for any reason not reliable.

The wet-rail tests were very erratic. In many instances they were much longer than the corresponding stop made on the dry rail, and also in many instances they were much shorter. Two consecutive stops, made apparently under identical conditions, would vary from each other in a ratio sometimes as high as four to one. Although operation under bad rail conditions is very important, the results of these wet-rail tests was such that no consistent conclusions could be obtained from them, and they were for that reason disregarded.

The motor-reverse stops were disregarded. This was for many reasons. In the motor-reverse stops the stop was obtained principally by the motor. It was not a

Tables II, III and IV show the average dry-rail stopping distance obtained by the various brakes on the three types of cars at each speed and load.

COMPARISON OF TESTS

To analyze properly the record of these tests it was necessary to use some method of summarization. To compare directly stops at all speeds and loads is impossible. A method should be used, if possible, which will summarize accurately into a single figure the results obtained with a given brake at all speeds and loads.

The usual method of comparing stops at different speeds is by means of the braking rate; that is, by the amount by which the speed is reduced per second. However, this method is open to objection when the speeds differ by a relatively large amount. At low speeds the braking distance is short. A change of a small amount in the braking distance is a large percentage and appears as a considerable change in the braking rate. The damage caused in an accident is usually a question of the distance covered in braking. Comparison by means of the braking rate at all speeds would have the result that a small difference in the braking distance obtained with two different brakes at low speeds (due possibly to the different efficiency of the brakes at those speeds) might cause a considerable change in the final summary figure.

If all brakes are tested at the same speeds, a more

satisfactory method of summarizing results is to add the distances obtained at the several speeds. Two brakes may be compared by a comparison of this sum. This total figure takes due account of the amount by which either brake is superior at each speed. A small difference in the distances covered at certain speeds does not affect unduly the final figure.

This was the method of summarizing employed by the commission. The distances covered in braking from all speeds were added. A total figure was thus obtained for each of the three loads and the three totals were averaged. This final average was the summary figure used to express the value of the brake.

In Table V the results of the tests have been summarized in this manner and the brakes arranged in the order of their value. The curious relative standing of the

TABLE V—RELATIVE VALUE OF VARIOUS BRAKES

No. 400 Series				Sum of
Type of Brake	Sand	Car No.		Braking
				Distances
Air, 95 per cent.	Yes	432	168'	4"
Brake "A" (Jan.)	Yes	454	173'	3"
Air, 90 per cent.	No	432	177'	1"
Air, 95 per cent.	No	432	177'	3"
Air, 90 per cent.	No	432	179'	10"
Air, 100 per cent.	Yes	432	182'	1"
Air, 85 per cent (April)	Yes	432	185'	5"
Air, 100 per cent.	No	432	186'	6"
Air, 85 per cent (Dec.)	No	432	191'	1"
Brake "B"	No	448	193'	5"
Air, 85 per cent (April)	No	432	195'	7"
Brake "A" (April)	No	454	197'	7"
Brake "A" (April)	Yes	454	197'	10"
Brake "C"	No	441	208'	1"
Brake "D"	No	422	209'	1"
Brake "E"	No	453	218'	2"
Brake "E"	No	432	253'	8"
No. 2700 Series				
Air, 95 per cent.	Yes	2723	179'	9"
Air, 90 per cent.	Yes	2723	181'	7"
Air, 100 per cent.	Yes	2723	181'	8"
Air, 95 per cent.	No	2723	193'	3"
Air, 90 per cent.	No	2723	199'	0"
Air, 100 per cent.	No	2723	201'	1"
Air, 85 per cent.	No	2723	206'	6"
Air, 85 per cent.	Yes	2722	206'	11"
Air, 85 per cent.	No	2722	215'	10"
Air, 85 per cent.	Yes	2723	218'	9"
Air, 85 per cent.	No	2720	220'	8"
Brake "A"	Yes	2723	221'	4"
Air, 85 per cent.	No	2723	224'	6"
Air, 85 per cent.	No	2721	224'	11"
Brake "A"	No	2723	229'	4"
Brake "B"	No	2722	229'	8"
Brake "B"	Yes	2722	231'	3"
Brake "C"	No	2721	243'	2"
Brake "D"	No	2720	256'	8"
No. 2500 Series				
Air, 100 per cent.	No	2500	149'	1"
Air, 100 per cent.	Yes	2500	154'	9"
Air, 95 per cent.	No	2500	157'	10"
Air, 90 per cent.	No	2500	158'	10"
Brake "E"	Yes	2501	162'	8"
Air, 90 per cent.	Yes	2500	162'	10"
Brake "E"	No	2501	164'	1"
Air, 95 per cent.	Yes	2500	166'	5"
Brake "A"	Yes	2584	166'	11"
Brake "A"	No	2584	167'	1"
Air, 85 per cent.	No	2500	169'	8"
Air, 85 per cent.	Yes	2500	181'	8"

a pressure must be exerted on the brake handle ranging from 22.8 to 108.3 lb. Dynamometer readings taken during the tests showed that the motorman exerted 105 lb. pressure on the brake handle. In view of the fact that it is necessary to exert 108.3 lb. to obtain 85 per cent pressure on the wheels, it appears reasonable to assume that 105 lb. is a pressure which may be exerted by most motormen when necessary in actual operation and will often be exceeded, especially at times when the motorman's only thought is to apply the brakes quickly and with the greatest possible force.

Table VI also gives the final summary from Table V and the braking ratio caused by 105 lb. on the brake handle.

From Table VI two conclusions seem evident:

First—Although there are inconsistencies in the results, the braking distance obtained in the test varied with the brake-handle pressure necessary to give 85 per cent braking ratio. The result is that the tests were to a great extent an index not of the relative value of the different hand brakes but of one brake leverage over another.

Second—Almost every hand brake exerted a very high pressure on the wheels. With air brakes the maximum pressure exerted on the wheels was 100 per cent. With hand brakes the table shows pressures as high as 392 per

TABLE VI—BRAKE PRESSURE CAUSED BY 105-LB. BRAKE-HANDLE PRESSURE

No. 400 Series:	Brake-Handle Pressure to Give 85 Per Cent Brake Ratio, lb.	Average of Sum of Braking Distances	Brake Ratio
			Caused by 105-lb. Brake Handle Pressure, Per Cent
Brake "A"	28.5	185' 5" (Ave.)	313
Brake "B"	34.4	193' 5"	259
Brake "C"	39.3	208' 1"	227
Brake "D"	41.8	209' 1"	214
Brake "E"	70.0	235' 11" (Ave.)	127
No. 2700 Series:			
Brake "C"	36.0	243' 2"	248
Brake "A"	42.4	229' 4"	210
Brake "B"	42.4	229' 8"	210
Brake "D"	63.5	256' 8"	140
Brake "E"	108.3	...	82
No. 2500 Series:			
Brake "A"	22.8	167' 1"	392
Brake "E"	Not given	164' 1"	...

NOTE.—The braking distances given in this table are the distances obtained without sand.

cent, and this figure may be exceeded by strong motormen.

It appears therefore that practically all hand brakes tested exerted a much greater strain on the rigging than air brakes even when the air brakes are adjusted to comparatively high braking pressures.

Skidding occurs when the friction between wheel and shoe exceeds the friction between the wheel and rail. The effect of the skidding is greatly to increase the braking distance. When the motorman can pay entire attention to stopping the car in the shortest possible distance he is often able to avoid skidding by the "feel" of the brakes. At the time of an emergency, however, scientific braking becomes impossible. The motorman instinctively applies the brake as quickly and with as much force as possible. With the enormous pressures at his command with most hand brakes as tested, skidding is certain at times of emergency, and the distance covered in braking would be far greater than the distances obtained in these tests. On the other hand, with air brakes, the maximum pressure which can be applied to the wheels is fixed and the distances obtained in these tests should closely represent the distance which would be obtained in actual service.

CONCLUSIONS

Therefore to the extent that the tests were a reliable source of evidence, they proved:

- (1) That air brakes properly adjusted are superior to any hand brake tested.
- (2) That in actual service the strain produced in the

various ratios of the air brake on Car 2500 is due to the fact shown in Table IV that with the seated load the braking distances at 95 per cent pressure were longer than the braking distance at 90 per cent or 100 per cent. No explanation is given of this inconsistency.

Two conclusions may be drawn from these tables:

First—On each series of cars air brakes appeared superior. It is true that on the 400 series one hand brake showed to advantage, though even this was inferior to air. However, a second test on the same brake gave results inferior to any results obtained with an air brake.

Second—No hand brake tested showed itself consistently better on all cars than air even at 85 per cent pressure, a pressure which in these tests gave the poorest results.

With the other data submitted to the commission blueprints were supplied showing the leverage with each type of brake. These are given in Table VI. From this table it appears that to exert 85 per cent pressure on the wheels

rigging by an air brake is much less than that caused by those hand brakes which showed themselves most efficient.

(3) That in an emergency the possibility of skidding is much greater with a hand brake than with an air brake, and that therefore the results obtained in actual service with a hand brake would be inferior to those obtained here.

The result of the tests, therefore, was to confirm the commission in its previous opinion. In the final order on the motion, made June 27, 1912, Sec. 4 of the order relative to service cars was rescinded, increased time was given to the companies to comply with the order, but no change was made in the weights affected.

STATEMENT BY MR. FOWLER

With the permission of Mr. Dodd, the foregoing article was shown before publication to George L. Fowler, engineer in charge of these brake tests for the Brooklyn Rapid Transit Company. Mr. Fowler replied by letter as follows: To the Editors:

I have read the article prepared by Mr. Dodd on the Brooklyn brake tests with a great deal of interest, and it reminds me very forcibly of a remark made by the late M. N. Forney. He said that if you would let him take any locomotive in the country and paint its smokestack a pale sky blue and then let him conduct the tests, he would show a saving in coal over any other locomotive that could be pitted against it. In short, he said that one could take any series of tests ever conducted and by a careful selection of data could prove any proposition whatever.

That is exactly what Mr. Dodd has done. He has carefully eliminated every particle of data that bore in favor of the hand brakes, such as the wet-rail or bad-rail tests and the reversal stops, and has regarded as available only that which tended to prove his previously determined position. He has also absolutely ignored a great mass of other tests, several hundred in number, the results of every one of which were adverse to his position.

To answer him in full would require taking up every item that he presents and showing how carefully he has eliminated all adverse evidence touching it, and it is doubtful if your readers would care to wade through it. The suggestion is, therefore, offered that if anyone is really interested he should consult the original records before forming a final opinion regarding the matter which Mr. Dodd has so ingeniously treated.

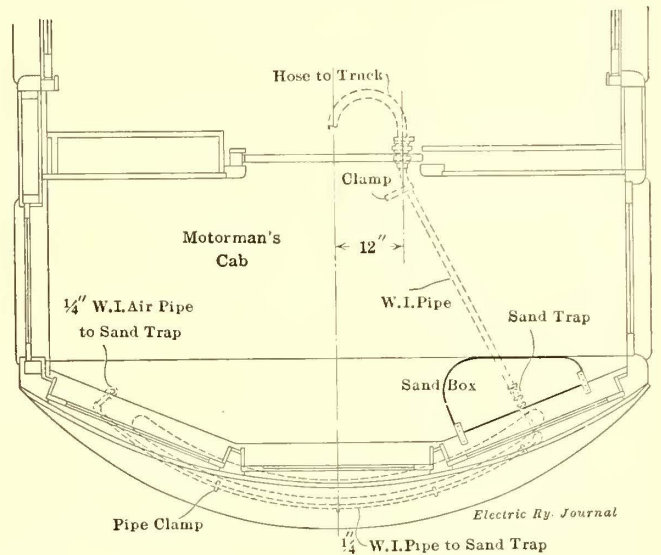
GEO. L. FOWLER.

AIR SANDER ON INTERURBAN CARS

A. C. Adams, superintendent motive power Oregon Electric Railway and United Railways, has designed and had in operation for over a year on all of their passenger motor

The sand drops by gravity from the sand box through a 1 1/4-in. iron pipe into a trap made of a 1 1/4-in. x 1-in. standard pipe cross which is closed on the bottom with a 1 1/4-in. pipe plug. Should the trap become clogged the plug can be easily removed.

Air is admitted to the trap from the whistle pipe through a 1/4-in. pipe into a horizontal nozzle which extends about three-fourths of the way through the trap and at right angles to the drop of the sand. The admission of air is controlled by a globe valve close to the motorman's brake

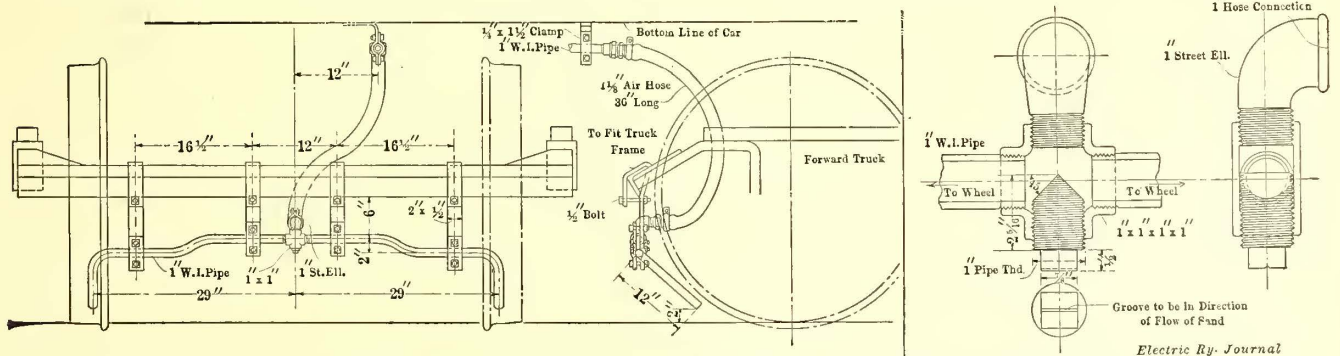


Layout of Sanding Equipment on Oregon Cars

valve. From the trap the sand is blown through a 1-in. pipe which connects to a 1 1/8-in. air hose 36 in. long, providing for the swing of the truck. The bottom end of the hose has a nipple which connects through a street ell into a 1-in. x 1-in. pipe cross, where the sand is separated by means of a wedge-shaped plug in the bottom of the cross. The separated sand goes to each leading wheel through 1-in. pipes which are bent to deliver sand to the rails directly ahead of the wheels. The pipes to the wheels are securely fastened to the truck frame.

The rigging is made up in the company's shops, as all the material which enters into the construction is easily available in any shop of moderate size and it can easily be put together by ordinary mechanics.

In the entire time that it has been in operation not a single case has occurred where sand did not flow freely to rails. An over-supply of sand cannot feed into the trap,



Sanding Equipment on Oregon Car and Detail of Pipe Cross with Wedge-Shaped Plug

cars the simple and efficient air sand rigging which is shown in the accompanying illustrations.

A large sand box made of No. 14 iron and having a sloping bottom is provided in the cab or vestibule of the car.

nor has any trouble been experienced from sand blowing back into the sand box.

Good sharp, clean sand is used, and this sand is thoroughly dried in a sand drier at the Portland shops.

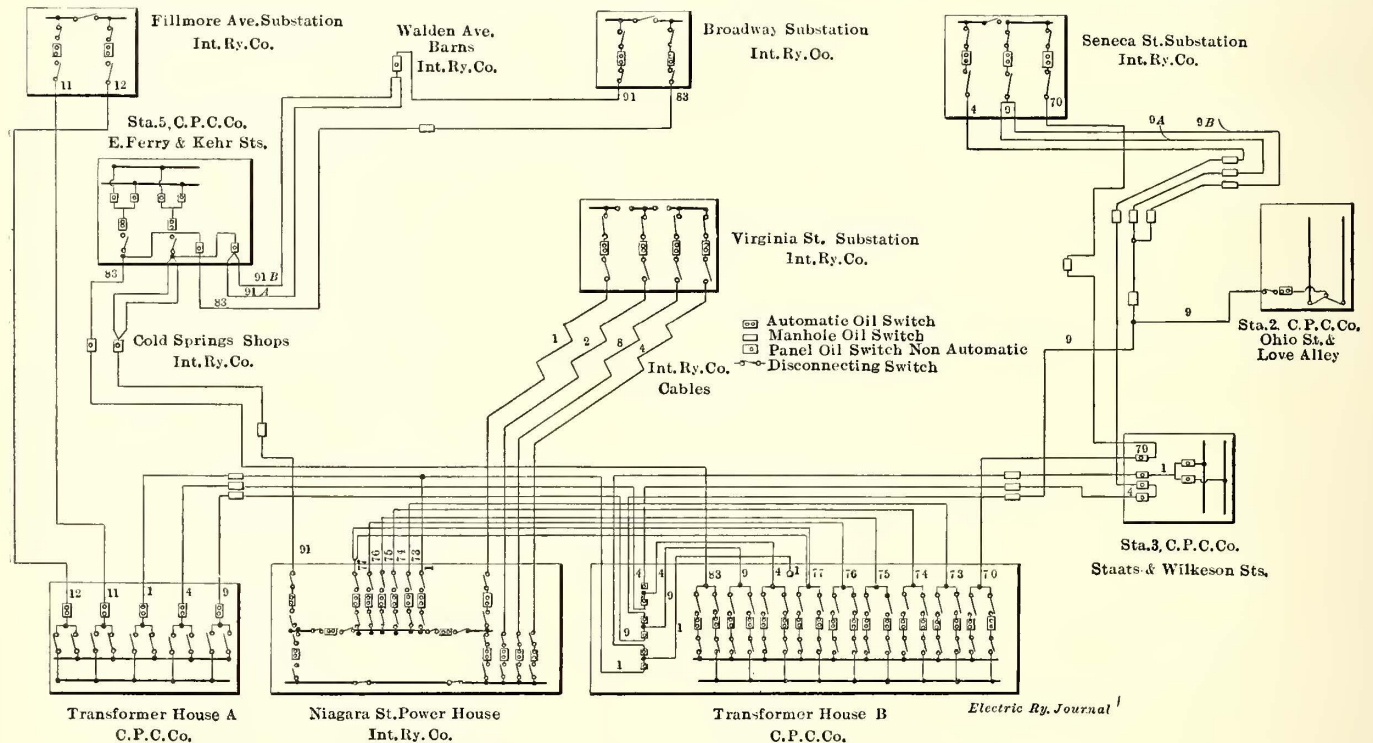
Niagara Power for the International Railway Company

Power Purchased from the Niagara Falls Companies Is Used Almost Exclusively by the Buffalo Street Railway—The Company's Steam Stations Are Operated Only During Rush Hours and Large Storage Batteries Are Used to Reduce the Peaks

The Buffalo Railway Company, now part of the International Railway Company, was one of the first large railway customers of the Niagara Falls power companies, having used Niagara power about fifteen years. At first four 400-kw rotary converters were added to the equipment of the Niagara Street power house as an experiment. The results were so satisfactory that no new steam generating equipment has since been purchased, and additional substations have been installed as the demand for power has grown. Two new substations have been opened recently, making a total of nine, including one in the International Railway Company's power house in Buffalo and one in the

heaters take the exhaust from the auxiliaries, but the piping is arranged so that the engine exhaust can be delivered to one heater if desired.

The direct-current output of this plant is used in the vicinity and is supplemented by the output of two 400-kw and two 1000-kw rotary converters located in the engine room. The former are 500-r.p.m. and the latter 250-r.p.m. machines. A large storage battery also placed in the plant assists the d.c. generators and the rotaries in supplying the local demand for d.c. power. The station is operated for several hours each day during the morning and evening peaks. It is loaded to the limit during the evening peak, 40



Buffalo Power—Diagram of High-Tension Distributing System

power house of the Cataract Power & Construction Company at Niagara Falls. At present the steam plant is operated merely as an auxiliary to carry as much of the peak loads as is possible. Five very large storage batteries also assist in handling the peaks.

The steam plant in Buffalo comprises two sections, one producing alternating, the other direct current. In the a.c. section are two Allis-Chalmers Corliss engines of 2150-hp capacity each, direct-connected to G. E. alternators of 1500-kw capacity producing three-phase current at 11,000 volts and twenty-five cycles. These generators are operated in phase with the Niagara Falls current. There are three Lake Erie vertical compound engines, each of 1250 hp, direct-connected to 800-kw, 600-volt d.c. generators. The boiler plant contains nineteen B. & W. water-tube boilers rated at a total of 5800 hp and containing 68,000 sq. ft. of heating surface. A 27-in. vacuum is maintained by means of Worthington jet condensers, and the feed water is passed through two Gouber heaters of 2000 hp capacity each. Ordinarily these

per cent overload being carried at times. Even with this output and that of the batteries there is still a considerable peak in the load line of the transmission system.

In addition to the steam plant in Buffalo the company owns and operates a small hydroelectric station on the Canadian side of the river nearly abreast of the Horseshoe Fall. This has a capacity of 2500 kw. This supplies d.c. power to a railway line connecting Queenstown and Chipewa and forming part of the famous international belt line.

Niagara power is received from the terminal stations of the Cataract Power & Construction Company, which are near the Niagara Street power house and in which the voltage is reduced to 11,000 for distribution in underground cables about the city. The general lay-out of the cables and substations is shown in the accompanying drawing, which, with the key, is self-explanatory. Each substation is supplied with power over at least two independent cables so that continuous service is assured. Temporary interruption can also be cared for in most cases by the batteries.

In Buffalo there are four substations in addition to the one in the power house. In these substations 1000-kw rotaries have been standard for some time, although the first ones, which are still operating satisfactorily, were of 400-kw capacity. The early 1000-kw machines had twelve poles

rotaries in the power house of the Niagara Falls Power Company.

There are five storage batteries connected with the distribution system, one at the Buffalo power plant, two at the Virginia Street substation, one at Lockport and one at

TABLE SHOWING TYPICAL POWER CONSUMPTION RECORDS FROM ALL SOURCES OF INTERNATIONAL RAILWAY COMPANY

	PURCHASED POWER				STEAM POWER			STORAGE BATTERIES		
	Buffalo	Tonawanda, Lockport,	Niagara Falls	Total	A.C.	D.C.	Total	Buffalo	Tonawanda, Lockport	Total
Maximum hp	16,702	2,507	.....	19,209	2,209	1,977	4,186	4,284	1,236	5,520
Minimum hp	1,908	220	.....	2,128	1,395	824	2,219	.....	.....	.....
Average hp	10,474	1,595	.....	12,069	2,172	1,311	3,483	1,809	370	2,179
Kw-hr.	187,541	28,555	.....	216,096	2,965	3,914	6,879	7,868	2,622	10,490
RECORDING WATTMETER READINGS										
D.c. kw-hr.	.....	.....	.....	.....	.....	4,410	.....	.....	.....	.....
A.c. kw-hr.	.....	34,400	11,800	.....	3,500	.....	.....	.....	.....	.....
Maximum No. cars in service in Buffalo, on B., B. & L. and S. L.	549				Kw-hr. per car mile outside Buffalo, exclusive of B., B. & L. and S. L. 3.86					
Car miles in Buffalo, on B., B. & L. and S. L.	51,254				Average volts at d.c. bus, Buffalo, 615; T., L. & O., 615.					
Kw-hr. per car mile in Buffalo, on B., B. & L. and S. L.	3.81				State of weather, 8 a. m., partly cloudy; 6 p. m., clear.					
Car miles outside Buffalo, exclusive of B., B. & L. and S. L.	12,746				Temperature, 8 a. m., 67 deg. Fahr.; 6 p. m., 73 deg. Fahr.					

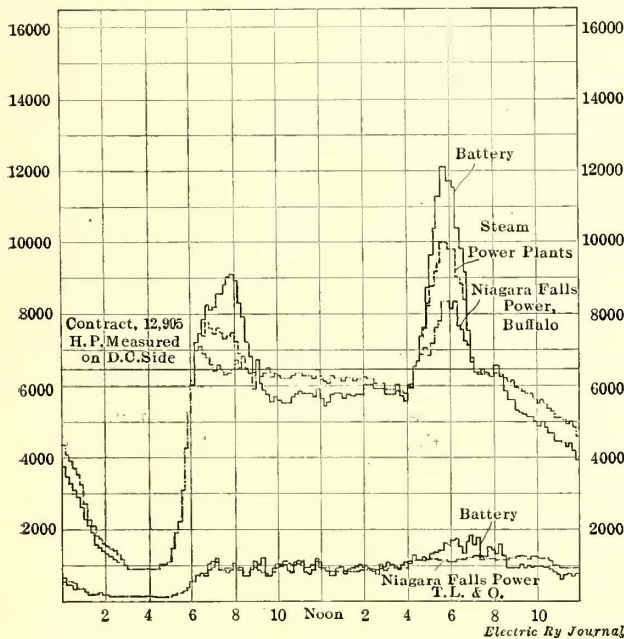
SUMMARY FROM OPERATIONS FEB. 24, 1913

	PURCHASED POWER			STEAM POWER			STORAGE BATTERIES			
	Buffalo	Tonawanda, Lockport,	Olcott	Total	A.C.	D.C.	Total	Buffalo	Tonawanda, Lockport	Total
Maximum hp	20,281	2,802	.....	23,083	4,884	2,966	7,850	4,120	1,483	5,603
Minimum hp	4,772	589	.....	5,361	931	824	1,755	.....	.....	.....
Average hp	13,814	2,039	.....	15,853	3,732	2,334	6,066	1,576	549	2,125
Kw-hr.	247,331	36,520	.....	283,851	21,805	11,900	33,705	4,895	3,216	8,111
RECORDING WATTMETER READINGS										
D.c. kw-hr.	.....	.....	.....	.....	.....	11,900	.....	.....	.....	.....
A.c. kw-hr.	.....	41,500	.....	.....	24,500	.....	.....	.....	.....	.....
Average volts at d.c. bus, Buffalo, 615; T., L. & O., 615.										
State of weather, 8 a. m., snow; 6 p. m., clear.										
Temperature, 8 a. m., 12 deg. Fahr.; 6 p. m., 13 deg. Fahr.										
6:20 p. m., Falls power off Tonawanda and Lockport stations.										
6:26 p. m., all d.c. feeders on Falls power, Tonawanda station.										
6:33 p. m., all d.c. feeders on Falls power, Lockport station.										
Cause: Ground on feeder No. 80.										

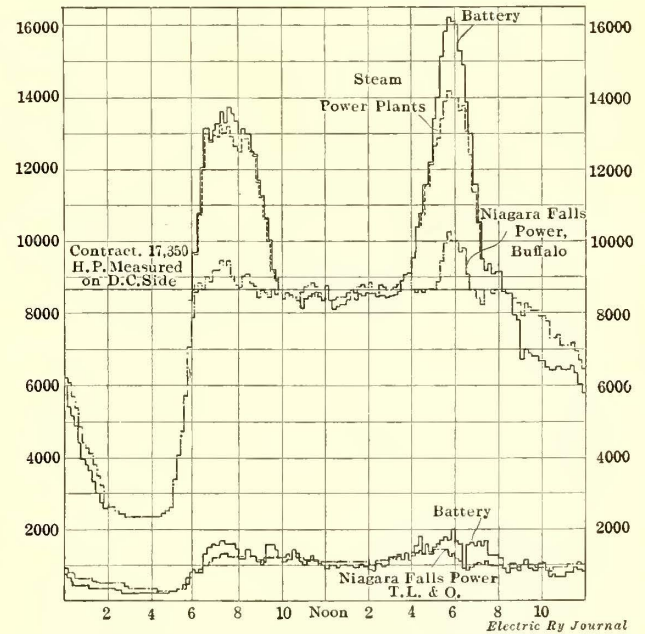
and made, therefore, 250 r.p.m. Later the eight-pole type, with a speed of 375 r.p.m. were used, and the last ones purchased and recently put into operation are six-pole inter-pole converters making 500 r.p.m.

The substations outside of Buffalo are at Tonawanda,

Tonawanda. These were originally installed by the Electric Storage Battery Company, the first one in May, 1898. They have the following sizes, the capacities given being based on a one-hour discharge rate: Buffalo power house, 2160 amp-hour capacity, fifty-five G plates; Virginia Street substation,



Buffalo Power—Typical Summer Load Curve



Buffalo Power—Typical Winter Load Curve

Lockport, Olcott and Niagara Falls. The former three are for the interurban lines and a small street system in Lockport. They occupy separate buildings. The Tonawanda and Lockport stations are each provided with a storage battery. The Niagara Falls lines are supplied with power from

two batteries each of 1920 amp-hr. capacity, forty-nine G plates; Lockport and Tonawanda, each one battery of 1280 amp-hr. capacity, thirty-three G plates. The total battery capacity is, therefore, 8560 amp-hr. The cells all have Tudor positive and box negative plates, the original Man-

chester plates having been gradually replaced with the latter type, the last having been but recently installed.

The batteries are now maintained by the Gould Storage Battery Company under a guarantee that the capacity shall always be above 90 per cent of the rated value. The maintaining company does all repairing and treating to keep the battery up, mends leaky tanks, etc. The railway company has simply to supply the necessary acid and operate the batteries. At the termination of the contract, which is for ten years, the batteries are to be in perfect condition.

The batteries are regulated by motor-driven boosters controlled by the standard carbon-pile regulator made by the Electric Storage Battery Company. They are used for regulation and the control of peaks, the latter purpose being the principal function in Buffalo, the former in Lockport and Tonawanda. As the company cannot use the power for which it has to pay at times of very light load, it costs nothing to charge the batteries, and the only expenses are the overhead and maintenance charges on them. On the other hand, the batteries reduce the transmission line load at the time of the peak when the production of energy is most expensive.

The operation of the engines and batteries in modifying the load line is brought out clearly in the accompanying charts. These have been selected to show typical summer and winter loads. Neither shows extreme conditions. The charts do not show the output of the substation in the Niagara Falls power plant. This is operated by the power company which keeps the record separately. The Buffalo load is shown in the center of the chart and the Tonawanda, Lockport and Olcott load at the bottom. On the peaks of the Buffalo load line the solid line is the combined output of all sources of power. The dash line shows the combination of Niagara and steam power, and the dash-and-dot line the Niagara power. The difference between the outputs shown by the solid and dash lines is that of the storage battery. When the solid line is above the other the battery is discharging. When the reverse is true the output is negative, i.e., the battery is charging. The chart shows that the battery is charged immediately after the evening peak.

The "firm" or minimum power which was charged for on these dates is also shown for comparison with the actual consumption of Niagara power. The value of the firm power is decided upon in advance for each day of the year and the consumption of Niagara power is kept very close to the firm power line. This is remarkable when one considers that the operators of the battery and steam plants do not know what the total load is until the records from the different plants have been telephoned to the central office and combined. During the peaks this is done every ten minutes. The chart of Feb. 24 and the accompanying table show that the maximum load on the 4300-hp a.c. steam plant was 4884 hp and that on the 3750-hp d.c. plant 2966 hp. At the same time the entire storage battery equipment gave out 5603 hp, which, at a voltage of 615, corresponds to about 6800 amp, enough, if maintained, to discharge the batteries in one and one-quarter hours. With all of the supplementary power, however, the load on the transmission line went over 3000 hp above the minimum. Unfortunately there is a depression in the load line in the early morning representing a large quantity of unused energy which must be paid for, as by midnight the storage batteries are practically fully charged.

On the Tonawanda, Lockport and Olcott line the battery is used for regulating purposes, although it is of assistance also during the peaks. The peaks, however, are small compared with those in Buffalo and when compared with the capacity of the batteries. There are from sixteen to twenty-four interurban cars using power from the Tonawanda substation besides ten or twelve small cars in Lockport and two locomotives and two work cars which handle freight on this division.

The load on the small hydroelectric plant before mentioned has a considerable value all night, owing to the fact that power is supplied for lighting to Queen Victoria Park, Niagara Falls, Ontario, located along the right-of-way and that the power plant is heated by electric power. These non-railway elements of the load produce an unusually high load factor for this plant.

ELECTROLYTIC CORROSION OF IRON IN SOILS

A paper with this title, presented at the annual convention of the American Institute of Electrical Engineers at Cooperstown last June, described a series of tests conducted by the Bureau of Standards at Washington, D. C., as part of a more general investigation of the subject of electrolysis and electrolysis mitigation which has been in progress for some time past. The whole subject will be treated in a report which will be issued shortly by the Bureau of Standards dealing exclusively with the subject of electrolysis mitigation. The conclusions were in part as follows:

"Current density has a marked effect on the efficiency of corrosion, the efficiency being in general greater the lower the current density.

"The moisture content in the soil also has a marked effect on efficiency of corrosion, the corrosion efficiency being in general greater with increasing moisture content up to saturation of the soil. Beyond this point increased moisture content has comparatively little effect.

"There is no material difference in the efficiency of corrosion shown by the various kinds of iron commonly used in the manufacture of underground pipes.

"The efficiency of corrosion was found not to be a function of the voltage except in so far as the current density may be affected. Voltages as low as 0.1 volt to 0.6 volt showed practically the same efficiency of corrosion as 5 volts to 10 volts or higher.

"The experimental results given in this paper have an important bearing on the subject of electrolysis mitigation through the limitation of voltage drop in the negative return.

"For some years the chief means of preventing trouble from electrolysis in certain foreign countries has been the limitation of the permissible voltage drop between any two points on the return circuit. In some places the limit has been placed on the maximum voltage during peak load, whereas in other cases the average voltage for twenty-four hours has been the determining factor. It will be evident that if the total amount of damage which results is proportional to the average current, then the limitation of the average voltage would be more logical than the limitation of the peak-load voltage.

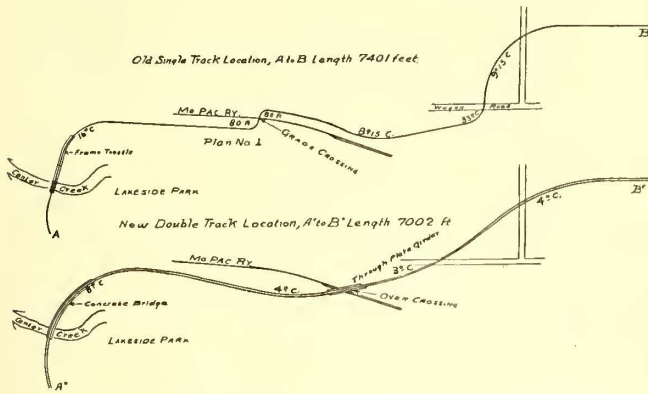
"In case the average voltage is the basis the cost of meeting the voltage limitation in any given case would be proportionate to the danger involved irrespective of the station load factor, whereas, if the voltage at peak load is the determining factor, the cost of complying with the requirements depends not only on the danger involved, but on the load factor of the system, and the poorer the load factor the greater its cost will be. It appears from the data presented in this paper that the rate of damage does not increase as fast as the voltage increases, because of the tendency toward lower corrosion efficiencies at higher current densities.

"This fact indicates that, with a given average all-day current, the actual amount of electrolysis that would occur would be less with a bad load factor than with a good load factor, and hence points to the undesirability of penalizing a high peak of short duration. It would appear very much more logical, therefore, in so far as the damage itself is concerned, to make the average all-day voltage the basis of the limitation rather than the voltage at time of peak load."

TRACK IMPROVEMENT ON THE SOUTHWEST MISSOURI RAILROAD

When the Southwest Missouri Railroad was built some twenty years ago to serve the rich mining district in the extreme southwestern corner of the State of Missouri the roadway was located and constructed in accordance with the practice prevalent at that time. But little consideration

by a long wooden trestle, the opposite bank of the river having a considerable elevation so that the track could be laid at grade practically to the river's edge. The wooden trestle, owing to its location, was exposed to action of drift during freshets in the river, and this, in addition to the ever-present possibility of fire, made it an undesirable form of structure where permanence as well as substantial construction was desired.

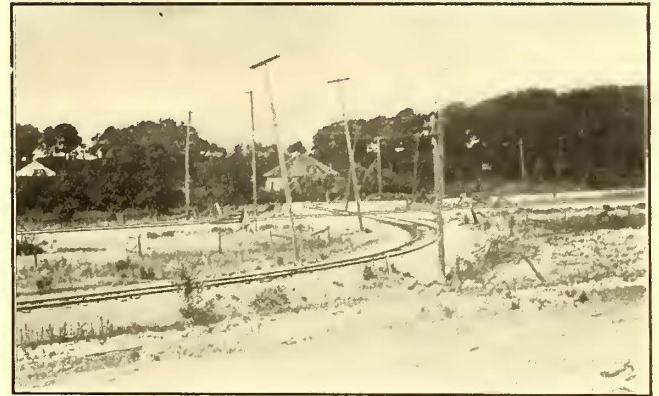


Old Single-Track and New Double-Track Construction

was given to the possibility of high-speed operation through the avoidance of sharp curves, and permanence of construction took secondary place to initial cost of construction.

The line operates an interurban service between the cities of Galena, Joplin, Webb City and Carthage, with branches to the smaller communities in the district, and maintains an extensive amusement resort called Lakeside Park some miles west of Carthage.

That part of the road which extends between Carthage and Lakeside Park was constructed in 1895, and notwithstanding the fact that the tracks of the Missouri Pacific Railroad were crossed at grade at a point a short distance east of Lakeside Park, the approach to the grade crossing from either side was made over exceedingly circuitous track,



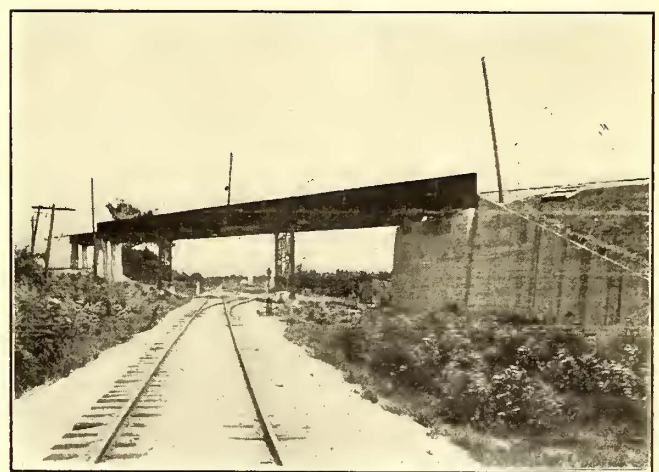
Grade Crossing Before Reconstruction

Of late the traffic between Carthage and Lakeside Park has grown to very considerable proportions, so much so, in fact, as to constitute a serious handicap upon the through service from Carthage west. In consequence, the management decided to reconstruct the entire right-of-way for 1½ miles west of Lakeside Park, straightening out the line, eliminating the dangerous grade crossing over the Missouri Pacific Railroad tracks, and double-tracking the whole section to permit handling large fleets of cars to and from the park without interference with the through traffic carried on the main line.

The work of reconstruction, which has just been completed, is shown in the accompanying line cut and half-tones, the former showing that the severe curves have been eliminated, as the maximum curvature on the new line is only



Concrete Viaduct Replacing Wood Trestle and Truss Bridge



New Plate Girder Bridge Over Missouri Pacific Tracks

the actual crossing being made in the middle of a reverse curve with 80-ft. radii on both sides. In addition, from one side the electric railway track approached the steam railroad crossing over a descending grade of 3 per cent, thus involving a difficulty in braking and hampering the motormen in case quick stops were necessary.

Just outside of Lakeside Park the line was carried over Center Creek, a stream of considerable volume during the greater part of the year, by means of a steel bridge of the through-truss type. This was approached from one side

8 deg. This straightening of the line shortened the distance between the two points marked A and B on the plat from 7400 ft. to a length of 7000 ft., or practically 6 per cent, and as the grade crossing over the Missouri Pacific track has been eliminated, a relatively enormous saving in running time has been effected, together with a marked reduction in the number of cars and men required to handle the local traffic.

The elimination of the grade crossing was effected by raising the grade of the electric railway tracks and spanning

the steam railroad, as shown in the accompanying illustration, by a through steel girder bridge. As a part of the reconstruction the wooden trestle approach and the bridge over Center Creek were replaced by a concrete deck viaduct with eight arches, the last of which bridges the river in one clear span.

All of the 7000 ft. of new construction, including both bridges, is double-tracked, and the cost of the entire work, including the purchase of the necessary right-of-way, was approximately \$100,000, or about \$15,000 per mile.

A STUDY OF ELECTRIFICATION ON THE SOUTHERN PACIFIC

In a paper read before the American Institute of Electrical Engineers this week, Allen H. Babcock, electrical engineer Southern Pacific Company, presented the results of a study recently made to determine whether there was such a reasonable chance for profitable electrification of the company's mountain lines as would warrant the expenditure of time and money involved in an exhaustive and final investigation of the problems of railroad electrification over the Sierra Nevada Mountains.

Mr. Babcock, in his paper, took under consideration the line through Tehachapi Pass, assuming the problem of its electrification from Bakersfield to Summit, or 49 miles of track, on the west slope and also from Mojave to Summit, or 18 miles, on the east slope, a total of about 67 miles of line, having an actual ruling grade of 2.2 per cent, or the equivalent, if compensated for curvature, of 2.4 per cent. The average grade on the west slope is, however, 1.44 per cent and that on the east slope 1.33 per cent.

In determining the energy consumption of trains moving over the mountain the actual characteristics of the line were used, and for load diagrams and substation spacing close approximations were adopted. An average east-bound train of 2000 tons such as was being hauled by four consolidation locomotives and an average west-bound train of 1250-1500 tons were therefore assumed, and to provide a flexible electrical unit it was proposed to use a 100-ton electric locomotive capable of handling a train of 500 tons, as many units being used per train as the load required. Passenger trains varying from 250 tons to 600 tons were assumed to be handled by single electric locomotives weighing 150 tons. A recent maximum train movement which occurred over the division in question consisted in twelve full-size freight trains east-bound and eight full-size trains west-bound in addition to the normal passenger movement of seven trains each way per day.

Experience with similar earlier reports, he said, had shown that, in general, there was little difference in total first cost and annual operating costs whether an overhead or a third-rail system was considered. The double overhead contact system gave maximum first cost and operating costs for the overhead construction and minimum costs and maintenance charges for locomotives. A single contact wire gave high operating costs for the overhead system but maximum costs and maintenance charges on the locomotives. The third-rail, on the other hand, gave high first cost but low operating costs for the contact system, with moderate first costs and minimum maintenance charges for the locomotives, but the total costs of operation were raised up to the level of the first two systems by reason of the necessary substation apparatus and attendance. In a preliminary study such as was made in this case it therefore mattered little what particular system of propulsion was chosen, and a 2400-volt d.c. third-rail system was assumed for the main line with an overhead contact wire in the yards and terminals.

The first cost of such an installation, based upon actual operating conditions existing at the present time, was estimated to be as shown in Table I.

The estimated annual operating costs with steam and electric locomotives are shown in Table II.

From the comparison of operating costs a loss of \$34,487 was shown, but this did not take into consideration any taxes or depreciation, which would increase the loss by \$285,000 if assumed at 5 per cent.

TABLE I.—PRELIMINARY TABLE OF FIRST COSTS

Six 2000-kw substations, approximate spacing 12 miles, at \$35 per kw	\$1,610,000
Generating station; three 18,000-kw turbines (rated on two-hour maximum capacity), 15,000 hp oil-fired boilers, condensers, piping, building, etc.	1,760,000
Twin-circuit 60,000-volt transmission line, with ten steel poles per mile suspension insulators at \$6,088 per mile, power house 20 miles from railroad; total length 70.5 miles	430,050
Overhead contact system in yards; single trolley carried on span wires across all tracks, steel poles	155,250
Contact system for main line; 140-lb. contact rail on long wood ties at \$10,225 per mile, 65.8 miles; siding with 75-lb. third-rail at \$7,000 per mile, 21.6 miles; total	825,000
Bonding, main line, 65.8 miles at \$1,120; sidings, 21.6 miles at \$900; total	122,300
Block signals; required on account of change from present d. c. signal apparatus to the a. c. apparatus necessitated by using track rails for propulsion current return	175,000
Shops and inspection shed	10,000
Electric locomotives; forty-seven 100-ton, for freight, at \$35,000; eleven 150-ton, for passenger, at \$40,000; this includes an allowance of eight freight and three passenger for shopping; total	2,085,000
Total	\$7,172,600
Credit by release of thirteen passenger, forty-seven consolidation and thirteen Mallet steam locomotives, plus 20 per cent for shopping	1,464,900
Net first cost	\$5,707,700

With purchased power the cost of transmission line and power stations would be eliminated, reducing the investment to \$3,827,700, and the total annual operating costs, exclusive of the cost of power, would then become \$450,609

TABLE II.—COMPARISON OF OPERATING EXPENSES WITH STEAM AND ELECTRIC LOCOMOTIVES

	Steam	Electric
Substation labor and supplies		\$59,700
Power house labor at \$64,780; repairs and supplies at \$20,000; total		84,780
Transmission and contact system maintenance; this includes high tension transmission at \$50 per mile, overhead construction at \$250, contact rail at \$150 for main line and \$100 for sidings, main-line bonding at 10 per cent of cost and side-track bonding at 5 per cent; total		36,576
Maintenance of way as affected by locomotives; estimated	\$126,890	83,285
Locomotive repairs; figures for steam taken from records and for electric assumed at 4 cents per mile	270,990	70,701
Passenger engine men's wages; for freight service assumed to be the same; in both cases for passenger the helper is eliminated	48,300	29,100
Fuel; oil to be used in both cases at a price of 40 cents per barrel; cost for steam taken from records; cost for electric estimated from gross average daily passenger tonnage of 4050 and freight traffic of 16,040 tons east and 10,600 tons west plus 10 per cent for slow movements, giving 144,000 kw-hr. per day at station; 70 per cent over-all efficiency of transmission	240,852	100,530
Total annual cost of operation	\$687,032	\$464,672
Bond interest on cost of electrification at 4½ per cent		256,847
Net totals exclusive of depreciation	\$687,032	\$721,519

for electrical operation. The saving, exclusive of power, over operation by steam would then become \$236,423 less \$191,385 for depreciation if assumed at 5 per cent, leaving \$45,038 with which to purchase about 53,000,000 kw-hr. at an annual load factor of 20 per cent. This would give a rate of about 0.45 cent per kw-hr., which was too low to be considered.

In conclusion, Mr. Babcock pointed out the difficulty of recommending electrification under such conditions if the opinion was to be based upon the direct financial profit to be realized. In fact, in the great majority of cases the profits of electrification had to be obtained indirectly, through increased track capacity or similar effects incident to electric operation.

The New York Public Library has just published a list of works to be found on its shelves relating to electric welding, compiled by William B. Gamble, chief of the division of technology. This bibliography is arranged in chronological order and contains an index of authors.

GISBERT KAPP ON PROGRESS IN HEAVY ELECTRIC TRACTION

In his presidential address delivered to the engineering section of the British Association for the Advancement of Science at the Birmingham convention, held Sept. 10-17, Prof. Gisbert Kapp presented a report on progress in heavy electric traction. After briefly describing the different systems of electric traction he gave more extended data on three-phase development. He said that the most obvious objections which had been raised against three-phase locomotives had been found to be of little weight in practical work. These objections were the complication of a double overhead wire, the danger that the motors would not share the load fairly and the inability to run the motors without rheostatic waste at intermediate speeds or to run at a higher than synchronous speed to make up for lost time. It had been found that the most objectionable feature was not the wire itself but the poles or bridges on which it is carried, and these are the same no matter what system of line current is used. The sharing of the load between three-phase motors had been solved by K. von Kando by the use of liquid resistances in which the level of the liquid was controlled by a solenoid under the influence of the operating current. This current, and consequently the tractive effort exerted by each motor, was automatically kept constant no matter what difference existed in the size of the drivers on the locomotives. Incidentally, this liquid rheostat control gave perfectly constant acceleration. The waste of energy consequent on rheostatic speed control and inability to run at more than synchronous speed in order to make up for lost time could be remedied by an adjustment of the timetable so that the synchronous speed would be high enough to make up for lost time and also by the employment of motors which could run economically at less than synchronous speed. In practice, three-phase trains were not less punctual than trains drawn by other kinds of locomotives. A train pulled by a.c. or d.c. series motors ran slower on an up grade or when it carried an abnormally heavy load. While this characteristic was valuable in limiting the excess load thrown on to the source of power, it was clearly not a condition which made for punctuality. A series motor could not recover lost time on an up grade whereas a three-phase motor would maintain practically the same speed as on the level or down grades so that the process of gaining time was not restricted to the easy parts of the line.

The problem of speed control without rheostatic waste had been solved in several ways, the simplest and most generally adopted being that of cascade and single working. In some of the Simplon locomotives only the stator was arranged for pole changing, the rotor being a squirrel cage. In this arrangement the advantages of cascade connection had to be given up, but the system had the merit of great simplicity because four speeds without rheostatic waste were possible. This was secured by a change in the number of active poles from twelve at starting to eight, six and four at top speed. Regeneration and braking, he said, could take place only if power was given to the motor. This was provided partly by the locomotive itself and partly by the train pushing it on a down grade. As this meant that the train was braked in front only, railway engineers had raised the objection that such a method was contrary to the accepted rules for safe operation, which require that even on a down grade all the couplings should remain in tension, namely, that each car must be independently braked. Here again practice had proved the theoretical objections to be without foundation. It was no doubt objectionable to brake a train in front only if the braking action was a jerky one, but with automatically controlled liquid rheostats the braking was so gradual and even throughout that it had been practicable to permit a higher down-grade speed with regeneration than with ordinary braking. The regulations

of the Italian State Railways permit on heavy down grades a speed of 18.6 m.p.h. for steam trains, but the electric freight trains are permitted to run at 27.9 m.p.h. This concession had not yet been extended to passenger trains, but nevertheless the economic gain was considerable. Thus regeneration saved 17 per cent on the coal bill, an amount which was sufficient to provide for interest and sinking fund on the electrical plant at the generating station. Steam trains on the Giovi line, consisting of 300 metric tons of cars and 202 tons of locomotive (one in front and the other in back), had been replaced by three-phase trains consisting of 380 tons of rolling stock and two locomotives each weighing 60 tons (also placed front and rear). Thus, there had been a saving in total weight of 12 tons and at the same time an increase in useful weight hauled of 70 tons. The average grade of this line, which carried the whole traffic between the port of Genoa and the plain of Lombardy, was 2.7 per cent, and the maximum was 3.5 per cent. The traffic

TABLE I—ITALIAN STATE RAILWAYS ELECTRIFIED ON THE THREE-PHASE SYSTEM

Location of Line	IN SERVICE			IN CONSTRUCTION		
	Lecco-Colico-Sondrio-Chiavenna	Campasso-Pontederimo-Busalla	Bussolengo-Bardonecchia-Modone	Savona-San Giuseppe-Ceva	Lecco-Monza	Genova-Sampierdarena-Ronco
Length, in km.	107	19	58	45	38	28
Heaviest grade per mile	22	35	30	25	12	17
Number of transforming stations	10	4	7	4	4	2
Transmission voltage	20,000	13,000	59,000	62,000	25,000	57,000
Trolley voltage	3,000	3,000	3,300	3,300	3,300	3,300
Frequency (cycles per second)	15	15	16½	16½	16½	15
Source of power	Water	Steam	Water	Water (steam reserve)	Water (steam reserve)	Water (steam reserve)
Number of electric locomotives	14	20	15	61 for the three lines		
Number of motor cars	10	.....	.....	.....
Weight of trains, minimum, metric tons	150	190	.....	Not given		
Weight of trains, maximum, metric tons	370	380	220	Not given		

TABLE II—THREE-PHASE ELECTROMOTIVES ON THE ITALIAN STATE RAILWAYS

	TYPE AND MAKER				
	034, Ganz	036, Ganz	038, Ganz	050, Westing-house	030, Westing-house
Number in service	2	3	4	40	16
Number building	.....	.....	.....	45	16
Total weight, tons	45	62	62	60	66
Weight on drivers	45	43.5	43.5	60	48
Number of driving axles	4	3	3	5	3
Total number of axles	4	5	5	5	5
Weight on drivers, tons	11.3	14.5	14.5	12	16
Diam. of drivers, in.	56	64	64	43	65
Frequency (cycles per second)	15	15	15	15	16½
Method of transmitting torque of motor to driving axles	Quill and flexible coupling } Cranks and connecting rods				
Speed, m.p.h.	18.6	19.8-39.7	13.6-27.9-39.1	14.0-27.9	23.3-31.4-46.5-62
Method of speed regulation	.....	Cascade	Cascade	Cascade	Cascade and pole-changing

was now handled with forty 60-ton electric locomotives. Each engine had five driving wheels connected to two eight-pole motors by gear wheels and rods. The pressure on each driving axle was 12 tons. Each locomotive developed 2000 hp at the hourly rating. Therefore 1 hp was obtained for each 66 lb. of engine weight.

Prof. Kapp then described Dick, Kerr & Company's 3500-volt d.c. trolley and 1750-volt d.c. motor system which, after two years' experimenting, was being installed on a short section of the Lancashire & Yorkshire Railway. The current was collected by pantograph from an overhead wire with catenary suspension. The train consisted of a motor car weighing 62 tons with four 300-hp motors, while the

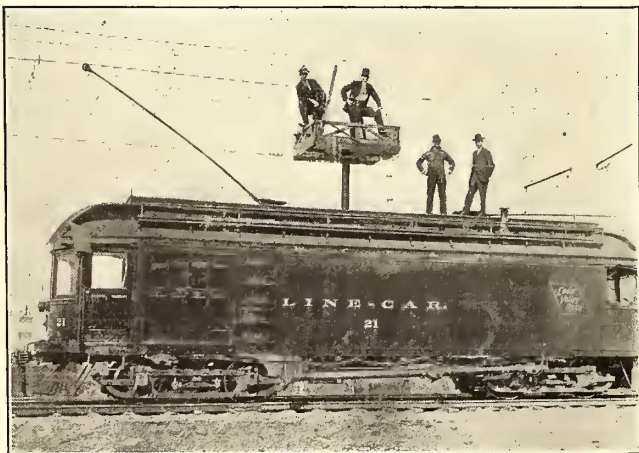
two trailers weighed 26 tons each. The makers had also informed him that they estimated the useful lift for a set of carbon brushes at 50,000 miles. The motors of this car drove the car axles through single reduction gearing and were controlled by contactors operated from a master controller. The current for operating these contactors, for driving the compressor motor and for lighting and heating was obtained from a 3500/210-volt motor-generator set. All motors had commutating poles. The weight of the motor car per horse-power was only 114.4 lb., much below the weight of an equivalent single-phase motor car. It was apparent from these figures that when employed for motor cars the d.c. system was lighter than the single-phase system, but main-line traction, including freight trains, was not going to be handled with motor cars. When locomotives of 2000 hp to 3000 hp were reached, the advantage in weight was likely to vanish. No high-voltage d.c. locomotive had yet been built for such a power, and it was therefore not possible to make a direct comparison, but if one could judge from the largest engines yet built for moderate voltage direct current there was little probability that the high-voltage d.c. system could beat the single-phase system and none whatever that it could beat the three-phase system.

The speaker then discussed the Lötschberg electrification, which was described in the *ELECTRIC RAILWAY JOURNAL* for Sept. 6. In conclusion, he referred to the proposed electrification of the Gotthard line, the main link of commerce between Germany and Italy. The part to be electrified first is that between Erstfeld and Bellinzona, a total length of 68.4 miles, of which about 29 per cent is in tunnel. The accompanying tables of three-phase electrification and locomotives in Italy were also presented by Professor Kapp.

LINE CAR WITH NOVEL FEATURES

To facilitate the repairs and construction of overhead lines on the Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia., the novel line car shown in the two accompanying halftones has been constructed from an old four-motor, double-end passenger car, 40 ft. 6 in. over all. The method of supporting and elevating the adjustable platform on the roof of this car is of particular interest.

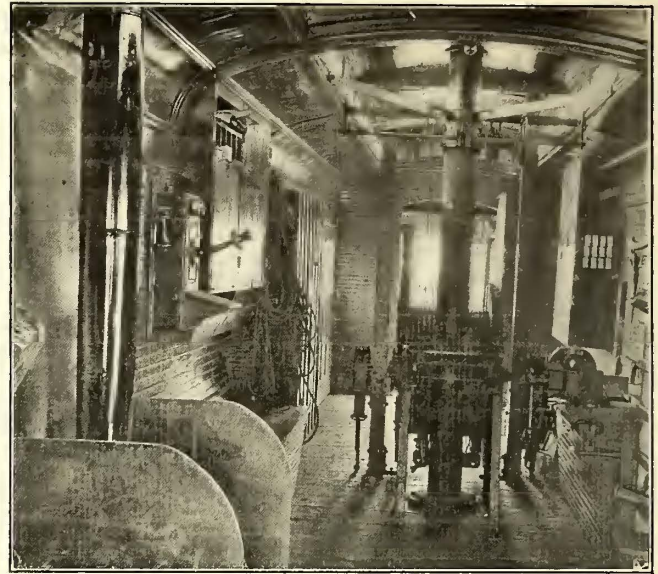
The platform is approximately 6 ft. square and is fitted with a folding hand rail on all sides. It is centered on a



Line Car for Waterloo, Cedar Falls & Northern Railway

7-in. pipe which extends down into the body of the car. The lower end of this supporting pipe is inserted in an 8-in. pipe mounted in a casting on the car floor, and the entire vertical structure is braced at the top with struts extending in four directions to the deck rail, as illustrated. The inner pipe has bar-iron lugs which extend through slots in the surrounding pipe. Light cables attached to these

lugs pass over pulleys supported on the braces near the roof of the car, thence to a winch bolted to the car floor beside the pipe platform supports. The slots in the exterior pipe are long enough to permit a 5-ft. lift to the platform. To relieve the strain coming to the elevator cables when the platform is in use by repairmen, two other slots near the top of the exterior pipe are fitted with small iron blocks



Interior of Line Car for Waterloo, Cedar Falls & Northern Railway

which may be clamped against the interior pipe by means of an ordinary strap-iron pipe clamp. In order to facilitate clamping and releasing of the adjustable platform in any position, this clamp is fitted with a hand wheel which is accessible from the car-floor level.

Another feature of this line car equipment is the permanent reel rack mounted in the center of the car body near the elevated platform standard. The rack bearings are substantially supported on two wooden posts bolted to the floor and roof of the car body. The axle on which the reels are mounted in this permanent rack is fitted with self-centering castings, and 12-in. pulleys at each end permit the application of friction band brakes. Braking is obtained by way of turnbuckles attached to either end of the bands and to the floor.

The standard practice in overhead line construction on this road is to string the trolley and messenger wires with current on the line. In order to accomplish this with the new line car, two 12-in. sheaves have been set in the roof near the reel rack. Trolley or messenger wire is fed through this set of sheaves, which must be in the front end of the car when doing this work, thence over the elevated platform where the linemen may tie the wire in at each pole.

Other equipment in the car includes an ordinary laundry stove for heating or cooking, a complete installation of shelving, bins and tool racks, and a Johnson's first-aid cabinet. A large cupboard for storing wire and a set of lockers for linemen's tools and clothing also form part of the interior fittings. The remaining floor space in the car interior is sufficient to permit 5 miles of trolley or messenger wire on reels to be carried at one time. Two 5-ft. sliding doors, one at each end of the car just back of the bulkhead, facilitate the handling of line material from an elevated platform into the car body.

In addition to the adjustable platform on the line-car roof, a 24-in. runway provided with a low pipe guard rail extends the full length of the car body on both sides of the monitor deck. A set of two chains and hooks attached to the side of the car body near the bottom of the underframing, one at each end of the car, is so arranged that two poles may be fastened and transported over the road.

NEW PORTABLE RAIL GRINDER

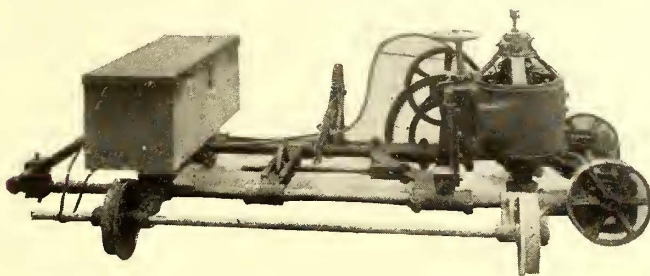
The construction department of the Cincinnati Traction Company has recently developed the novel portable rail grinder shown in the three accompanying illustrations. The grinder was designed primarily to obtain a uniform surface at rail joints on new track and to remove cups in the ball



New Rail Grinder—In Position for Hand Grinding

of the rail near joints on old track. As originally built it included a starting box and motor mounted on opposite sides of a small truck. Two rods on which the motor is mounted between the truck side frames extend beyond the gage line on the motor side and support a pair of wheels set at right angles to the grinder truck wheels. These wheels are slightly elevated above the top rail, and a handle on the opposite side of the truck makes it possible for two men to raise the grinder to the inclined position which transfers the weight to the two extra wheels, so that removal from the track is the work of a few seconds.

The new principles involved in the design of this machine are found in the cupped carborundum wheel, which is attached to the armature shaft, and in the manner of supporting the motor on the grinder truck. The motor is bolted to a hinged casting, which in turn is supported on two rods extending across the truck side frames. In the operating position the armature is vertical; transverse horizontal movement may be obtained by means of a hand wheel and screw. Vertical movement may be had by turning a hand wheel near the motor which operates a worm gear and slide mechanism on the motor and hinged casting. The angle of the armature shaft to the work may be varied by turning a handwheel on a rod which connects the hinged motor casting to the opposite side of the truck. A small set screw at the top end of the armature shaft provides an adjustment to eliminate chattering in the grinding wheel. If hand grinding

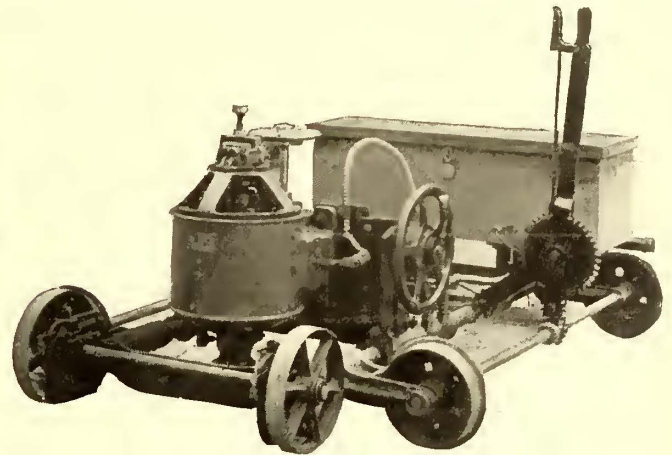


New Rail Grinder—Side View

is desired, the motor may be dropped on its hinged mounting to a horizontal position and the cupped grinding wheel removed. In this position a flexible shaft and an ordinary disk grinding wheel may be attached to the armature shaft as shown in one of the illustrations.

Since the original machine was built the inventor, F. J. Venning, construction engineer Cincinnati Traction Com-

pany, has found use for it in removing rail corrugations. In order to accomplish this purpose effectively he has added a lever and ratchet and an arched rack and pinion mechanism to permit a 36-in. horizontal reciprocating movement when the connecting lever is moved away from the operator. A link attached to this lever may be passed over



New Rail Grinder—End View

it and the ratchet handle which fixes the latter in the released position, thereby making it possible to transport the machine over the tracks when required.

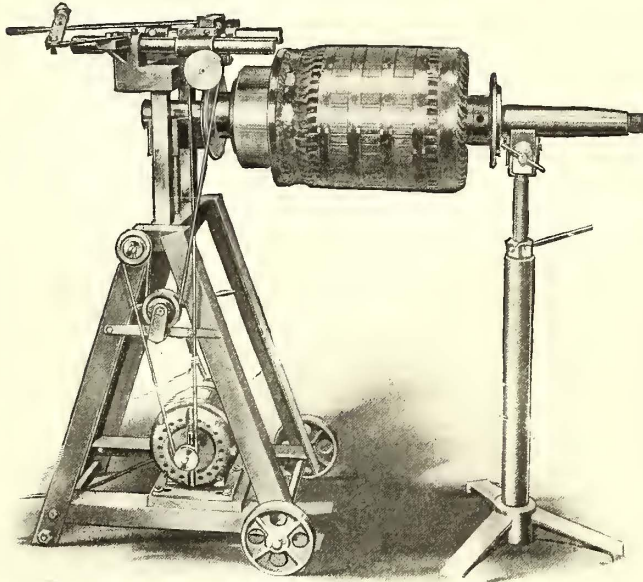
The inventor claims that the cupped carborundum wheel is superior to the ordinary disk wheel, where the grinding is done on the periphery, because of absolute assurance that the minutest corrugations will be removed. If the angle of the armature shaft to the work is changed, the ball of the rail may be ground to its original contour. Again, if the cupped grinding wheel is replaced with an ordinary disk wheel, the vertical surfaces of the rail head may be ground to a perfect gage line. Two metal bands have been passed around the periphery of the cupped carborundum wheel to avoid the possibility of breakage at high speeds. Energy for operating the grinding machine is obtained from the trolley wire by the use of a flexible cable with a hook connection, attached to a wooden pole. A water can and pipe leading to a point near the grinding wheel provide for wet grinding when rapid cutting is desired. The total weight of the machine is approximately 1000 lb., and since the motor is mounted on the same side of the truck as the wheels for transporting the machine from the track, it is possible for two men to remove and replace the grinder in ten seconds. This rail grinder has been patented by the inventor, and the manufacture and sales rights have been assigned to the Indianapolis Switch & Frog Company, Springfield, Ohio.

At the No. 3 plant of the Aluminum Company of America at Niagara Falls, N. Y., the problem of conserving real estate has been solved in one instance by resorting to a novel type of overhead-line construction. The motor-service wires reach the mill over a pole line and from the corner of the low concrete building which adjoins the main factory are carried by concrete poles integral with the building. Reinforcing for the building wall is continued to a point near the top of the pole. Braces of reinforced concrete are set on three sides of the poles at an angle of about 45 deg. The poles extend about 10 ft. above the roof, giving ample clearance between the wires on the lower cross-arm and the roof. This arrangement has the advantage of allowing the spur track beside the wall to be placed closer to the factory than would have been possible if wooden poles had been set in the earth near the building. Thus in loading and unloading cars the distance between the car door and the sill of the factory entrance is reduced to a few inches.

PORTABLE COMMUTATOR SLOTTER

The new commutator slotter shown in the accompanying illustration is being sold by the Electric Service Supplies Company to meet the demand for a portable machine. The illustration shows the slotter complete with an armature mounted in position. It is adjustable for railway motor armatures of varying lengths and diameters, beginning with the smallest air compressor.

As this machine is easily handled and transported, it is



Portable Commutator Slotter

frequently more advantageous to take the slotter to the armature rather than the reverse.

The commutator end of the armature shaft is supported in a V-bearing, which is adjustable in height to suit the diameter of the commutator so as to bring the cutting saw to the proper depth. This saw is clamped by a nut to the spindle, which runs in a long bearing bolted to the sliding head. The bearing is removable and is cheaply replaced

with the mica slots. This adjustment is of great importance because the mica frequently does not run true with the shaft.

This portable slotter requires a $\frac{1}{8}$ -hp motor for independent operation but when used as a stationary tool it may be belted direct to the counter or line shaft. The weight of the machine proper without the motor is 148 lb. The weight of the rear support is 35 lb.

NEW INTERURBAN CARS FOR THE GRAND RAPIDS, HOLLAND & CHICAGO RAILWAY

The Grand Rapids, Holland & Chicago Railway has recently purchased additional rolling stock from the Jewett Car Company, consisting of two straight passenger cars and two baggage and passenger cars. Each car also has a smoking compartment. The over-all dimensions are the same, 55 ft. 10½ in. long and 9 ft. wide. The difference between the two passenger and baggage cars is in the length of the baggage compartment. The cars are of the arched-roof design.

The bottom frame is of structural steel, the principal members comprising 8-in. channel side sills, two 8-in. I-beam center sills, 5-in. channel transverse members and a 6-in. I-beam on each side between the center sill and side sill to reinforce the front end of the car.

The side framing consists of angle posts faced with wood-side sheathing, which is 3/16-in. steel plate, from bottom of side sill to sash stool and riveted to all posts. A cab for the motorman was built in each car. As it was best for the strength of the car that the baggage door should be at its extreme end, the cab was specially designed with the back partition to fold against its side wall, it being securely held in both open and closed positions by means of Stearns locks. The baggage seats are hinged.

The cars are finished in inlaid mahogany with the Jewett Car Company's standard Gothic side finish. The outside Gothic lights are of pressed prism plate glass and the inside lights are of leaded art glass of a color in harmony with the mahogany finish. The cars are equipped throughout with plate-glass storm sashes and are arranged to be easily removable. The saloons are finished in white enamel and equipped with water coolers and Duner flush hoppers.



General View of Grand Rapids, Holland & Chicago Straight Passenger Cars

when worn. The sliding head is carried by two shafts projecting over the commutator and is moved over the slots by the lever, as shown in the illustration. The pivot positions of the operating lever can be changed and adjusted to suit the size of the commutator. The lever is placed at a height convenient for the average operator. The other end of the armature shaft is supported by a special stand which may be adjusted in height according to the diameter of the commutator and to bring it level with the cutter. A valuable feature of the stand is that it is adjustable cross-wise so as to bring the travel of the saw always in line

Where the lavatory was originally intended to be placed a cupboard containing six card tables was built instead. The wainscoting throughout the car is arranged with brackets to receive these tables. The baggage compartments are finished in ash stained mahogany color.

The cars are equipped with Westinghouse control for 1500-volt operation. Other car equipment includes Edwards' steel trap doors, Globe ventilators in the roof, Peacock brakes, Symington center bearings, roller side bearings, air sanders, Blount door checks, heavy brass cuspidors, M. C. B. radial couplers, etc.

GAS-ELECTRIC MOTOR CAR ON THE MIDLAND VALLEY RAILROAD

The Midland Valley Railroad has recently placed a gas-electric motor car in operation for supplementary service on the main-line section of the road between Wichita and Arkansas City, Kan. Very moderate service is required of the new gas-electric motor car. It makes one round trip a day over the northern division of the road, traversing 102 miles, the running time one way being two hours and forty-five minutes and the scheduled speed 18.5 m.p.h. There are seven regular stations and six flag stops along the route, the average distance between stations being 3.9 miles.

The car is of the General Electric Company's combination passenger, smoking and baggage compartment type. It measures 71 ft. 8 in. long over bumpers, 10 ft. 5 in. wide,

ing-pole railway motors of 100 hp each. By means of the controller they are placed progressively in series and parallel connection. Two extra points are provided for governing the motors by shunting the fields in obtaining the desired final speed acceleration in parallel. The resultant higher armature speeds permit the use of smaller pinions, and full utilization of the power input is secured through the entire speed range, from start to full speed.

The trucks are of the swing bolster type with elliptic bolster and coil equalizer springs. The bearings, treads, wheel flanges and axles conform to M.C.B. standards. The brake equipment includes hand brakes in addition to the combined straight and automatic air brakes. A high power Mazda incandescent headlamp and reflector, an air whistle and a pneumatic gong are furnished and a hot-water heater is installed for heating the car. To prevent freezing in



Gas-Electric Motor Car for Midland Valley Railroad

weighs approximately 52 tons and has a total seating capacity for eighty-six people. The cab in front containing the power plant apparatus is 11 ft. 11 in. long; next is the baggage room, 11 ft. long; then the smoking section, 12 ft. 5 in. long, and finally the passenger compartment, 27 ft. 11 in. long. A center vestibule with side entrances runs crosswise between the passenger and smoking compartments. There is also a rear platform entrance leading into the passenger compartment. The smoking section provides for twenty-five and the passenger compartment for sixty-one of the total seating capacity.

The usual standard all-steel construction, except in the case of the interior finish, prevails throughout the car. The frame consists of steel I-beams and channels, strongly cross-braced, and steel plates form the outside sheathing. The underfloor of the car is of wood, while between this and the floor proper a heavy felt lining is inserted, and the car sides are also interlined with felt. The interior trim is of mahogany, highly finished, and the ceiling is sheathed with composite board. The seats are made long enough to accommodate three persons and are covered with friezette plush in the passenger compartment and with genuine Spanish leather in the smoking room.

The generating unit consists of the standard eight-cylinder, four-cycle gas engine of the "V" type, direct-connected to a 600-volt, commutating-pole electric generator designed to meet the special conditions the service demands. Starting the engine is effected by compressed air. The engine can rotate at normal speed, irrespective of the speed of the car, and deliver its maximum power, a feature of great advantage on grades or in the event of emergencies. An auxiliary equipment is also provided, consisting of a two-cylinder, four-cycle gas engine direct-connected to a single-cylinder air compressor and lighting generator. The function of this set is to supply an initial charge of air for starting the main engine and to deliver power for lighting the car. The set is started by hand.

The method of control is similar to that of any standard trolley car. The car is equipped with motors of 200 hp capacity. Mounted on the axles of the forward truck are two GE-205 600-volt box-frame, oil-lubricated, commutat-

ing cold weather when the car is lying idle, the heater circulation may be connected to the engine-cooling system. The radiators are located on the roof and the circulation for cooling the engines is maintained by the thermo-syphon method. A 150-gal. gasoline tank is suspended underneath the car.

AN ALL-STEEL SWITCH BROOM

The Worcester (Mass.) Brush & Scraper Company is manufacturing the "Royal Worcester" switch broom in which all fibers are discarded in favor of well-tempered galvanized wire, thus preventing rust or other injury from dampness and salt. The broom is of strong construction, the ends of heavy pressed steel and the center square rod being held firm by check nuts. The top block brace is also of pressed steel instead of light tin. The top ferrule which holds the chisel is made of pressed steel, and this and the handle are securely fastened by rivets so that it is absolutely impossible for any of the parts to work loose. The hard wood which is used in the handle and block measures 4 ft. 4 in. over all, irrespective of the 5-in. chisel. All parts are treated with a rust preventive. An economical feature of this broom is the detachability of its parts. It is so constructed that the broom and handle are quickly and securely fastened by one operation. As the broom or the handle with the chisel may be purchased separately, most renewals are confined to the broom part itself.

Concrete resistors for lightning arrester service are in general use in the 11,000-volt and 22,000-volt systems of a Georgia central-station company. Into a solid concrete block measuring approximately 4 ft. long and 1 ft. on a side are cast two squares of bronze or copper mesh, one near each end. The block is then stood upright at the point of installation, being set a few inches into the earth to insure it against accidental overturning. The upper square of copper-mesh is connected to the double horn-gap, the lower square being connected to a couple of 8-ft. ground pipes or ground rods driven deep into the soil.

ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, ORDINANCES, FRANCHISES

Alabama.—Eminent Domain—Streets—Use—Double Tracks.

The laying of a second track by the street railway company in a city street 34 ft. wide, so as to afford double-track facilities, is not such unwarranted use of the street as entitles an abutting owner to enjoin the laying of such track, and it does not constitute such an additional burden or servitude as entitles him to compensation, though his use of the street in loading and unloading goods at a curbing may be thereby rendered inconvenient. (*Birmingham Ry., Light & Power Co. v. Smyer, Smyer v. Birmingham Ry., Light & Power Co.*, 61 Southern Rep., 354.)

Colorado.—Eminent Domain—Damage to Property—Road.

Const., Art. 15, Sec. 11, inhibits the construction of a street railroad in any city without the consent of the local street authorities. Rev. St. 1908, Sec. 5420, provide that the consent of the city to the construction of a street railroad shall not protect such road against any claim "for damages to private property which otherwise, without such consent, might be lawfully maintained against" the present constructing road, and Const., Art. 2, Sec. 15, prohibits private property from being taken or damaged for public or private use without just compensation. Held, that the liability of a street railroad company to a property owner for actual damage from the construction of its road was merely that which the city would have incurred if it had built and maintained the road. (*Harrison v. Denver City Tramway Co.*, 131 Pac. Rep., 409.)

Georgia.—Railroad Crossing on Dedicated Street.

If a commercial railroad company owning the land in fee on which its tracks were laid dedicated to a city in which the land was located a street crossing on the railroad tracks, and if thereafter, by permission of the city authorities, an electric street railway company proceeded to construct, along the street, tracks for the operation of street cars, the commercial railroad company would not be entitled to an injunction against the laying of the street car tracks on such crossing, on the ground that it interfered with the property of the railroad company and the use of its tracks and rendered the crossing dangerous. (*Southern Ry. Co. v. Rome Ry. & Light Co.*, 77 South-eastern Rep., 1126.)

Indiana.—Interference by Induction of Telephone Circuits by Railway Wires.

Where a telephone company and an electric railway company operating under city franchises place their poles and wires upon the street and there is interference with the telephone circuits from the higher voltage railway wires the railway company is not liable for damages to the telephone company unless it has exceeded its rights, been negligent in its construction, used faulty or improper appliances, or in some way unnecessarily caused injury, even though it might have built its railway elsewhere. (*Citizens' Tele. Co. v. Ft. Wayne & S. Ry. Co.*, 100 N. E. Rep., 309.)

Iowa.—Grant of Rights in Street—Effect of Invalid Grant.

Prior to the enactment of Code 1873, Sec. 464, empowering cities to authorize the location of street railways on their streets, the city of Des Moines had no power to grant a franchise to a street railway company, and an attempt to do so would be nothing more than a license until the ordinance granting the franchise was re-enacted after the adoption of Sec. 464.

The Legislature, in the act creating a corporation or by special grant, may confer upon any person or corporation a franchise to use and occupy the streets and public places of a city without other limitations than those found in the act itself or in the state constitution; and it may therefore grant exclusive, as well as permanent and perpetual, franchises if not limited by the constitution.

Under Code 1873, Sec. 464, granting the power to a city council to authorize or forbid the location and laying down of tracks for street railroads, a city council cannot grant a perpetual franchise, and may not do indirectly what it could not do directly. Therefore a perpetual franchise would not result from estoppel of the city to forfeit a franchise. (*State ex. rel. County Atty. et. al. v. Des Moines City Ry.*, 140 N. W. Rep., 437.)

Kansas.—Damages to Abutting Owner When Deprived of Access to Property.

An abutting owner is entitled to recover damages from a company which maintains a railroad track in the street in such manner as to cut off his access to his property—his ingress thereto and egress therefrom—notwithstanding that it is constructed in accordance with permission given by the public authorities. (*Stephenson v. Atchison Ry., Light & Power Co.*, 129 Pac. Rep., 1188.)

New York.—Effect of Consolidation Upon Fares and Transfers.

A street railroad corporation formed by the consolidation of three street railroad companies is within railroad law (Laws 1892, Chap. 676, Sec. 104) requiring contracting corporations to carry passengers for one fare and to give transfers for a continuous passage. (*Lowenstein v. International Ry. Co.*, 140 N. Y. Sup. Rep., 159.)

New York.—Street Railway Construction—Conditions Precedent.

A street railway before constructing its road over a public highway must obtain (1) the certificate of convenience and necessity from the Public Service Commission required by railroad law (Consol. Laws 1910, Chap. 49), Sec. 9, or the consent of the commission pursuant to Public Service Commission law (Consol. Laws 1910, Chap. 48), Sec. 53, or both; (2) the consent of the local authorities under Const., Art. 3, Sec. 18, and railroad law, Sec. 171, and (3) the consent of abutting owners, or the determination of commissioners in favor of construction of the road, under the constitutional section cited and railroad law (Consol. Laws 1910, Chap. 49), Sec. 171 and 174. (*Manhattan Bridge Three-Cent Line v. Brooklyn Heights R. Co. et al.*, 139 N. Y. Sup. Rep., 216.)

New York.—Unlawful Railway Competition Not a Public Nuisance.

The competition resulting from the unlawful operation of a street railroad is not such special injury as will authorize another railroad company to maintain a suit to abate it as a nuisance, since the injury to the other company arises from the operation of the road and not from its unlawful character. (*Manhattan Bridge Three-Cent Line v. Third Avenue Ry. Co. et al.*, 139 N. Y. Sup. Rep., 434.)

Texas.—Injunction Against Abandonment of Railway Operation—Enjoining Abandonment.

In consideration of the dedication of certain streets, an electric railway company agreed to construct and continuously operate thereon an electric road and thereafter did construct and for a time operated such road. Held, that a landowner could enforce the contract by an injunction restraining the abandonment of the line on such streets and was not limited to an action for damages for its breach where it did not appear that the operation of such line would prevent the company performing its duties to the public. (*Houston Electric Co. v. Glen Park Co.*, 155 S. W. Rep., 965.)

Virginia.—Maintenance of Streets—"Good Order."

Where the franchise of a street railway company obligated it to keep so much of the street as lay between the rails and 2 ft. outside in good order and repair, the street railway was obliged not only to keep the street in good repair but to repave with the same kind of material as the city uses for the rest of the street, when the municipality decides that, in the interests of progress, a new pavement is necessary, for not only is a franchise to be strictly construed, but "in good repair" does not mean "in good order," the latter being equivalent to "good condition." (*City of Danville v. Danville Ry. & Electric Co.*, 76 S. E. Rep., 913.)

Washington.—Charter Amendment—Street Railroad Franchise.

Laws 1903, Chap. 175, as amended by Laws 1907, Chap. 99, giving a city having control of any public street the power to grant authority for the construction of street railways thereon and to prescribe the terms and conditions thereof, rendered invalid Seattle City Charter, Art. 4, Sec. 20, providing that every grant of a franchise for the use of the streets shall provide for the purchase of the property placed in the streets by the grantee at a proper valuation, exclusive of the franchise, which was not revived by the

Laws of 1911, Chap. 17, relating to the form of organization of cities of the first class and providing that such cities may adopt a charter providing for the initiative, referendum and recall. (*Dolan et ux. v. Puget Sound Traction, Light & Power Co., City of Seattle, intervener*, 130 Pac. Rep., 353.)

Wisconsin.—Street Pavement—"Repair"—"Repave."

Milwaukee City Ordinance June 6, 1887, Sec. 4, granted certain rights and privileges to the Milwaukee City Railway Company, defendant's predecessor in interest, and obligated it to maintain in good and thorough repair during the charter term all portions of W Street between the outside rails and 1 ft. therefrom toward the curb, of the same material as that of which the street should be composed when such repairs should be necessary. Held, that while the word "repair" does not mean "repave," yet the section requires the company to keep the street in repair, and when a given pavement becomes defective the company must renew that portion of the pavement within its zone, using the same material as that which the city uses on the remainder of the street.

That a city required a railway company to make street repairs under a later ordinance after the passage thereof did not estop it from claiming that defendant was bound to repair a particular street under a prior ordinance containing broader requirements. (*State ex rel. City of Milwaukee v. Milwaukee Electric Ry. & Light Co.*, 139 N. W. Rep., 396.)

LIABILITY FOR NEGLIGENCE

Alabama.—Carrier's Servant—Profane and Insulting Language—Damages.

Damages for mental suffering, independent of other personal injury, may be recovered from a railway company by a female passenger for fright and shock due to profane, abusive and insulting language used in her presence and hearing by an employee of the railway company. (*Birmingham Ry., Light & Power Co. v. Glenn*, 60 Southern Rep., 111.)

California.—Premature Start.

It is negligence to start a street car prematurely after it has stopped for passengers to alight, whether it is started violently or not. (*Franklin et al. v. Visalia Electric R. Co.*, 131 Pacific Rep., 776.)

Connecticut.—Negligence of Infants—Presumptions.

In an action against a street railway for the killing of a boy of the age of eleven years it cannot be presumed that he was incapable of contributory negligence, where it appeared that he was bright for his years, and, consequently, if no evidence is offered upon this subject judgment must go against the plaintiff. (*Jollimore v. Connecticut Co.*, 85 Atlantic Rep., 373.)

Connecticut.—Negligence on Other and Similar Occurrences—Regular Stopping Points—Carriers—Injuries to Passenger—Evidence—Rules.

One's negligence on a particular occasion cannot be proved by showing negligence on another occasion, nor can his freedom from negligence on one occasion be shown by proof of his due care on other occasions.

On an issue as to whether defendant's car, on which plaintiff claimed to have been injured, stopped at a particular point where he claimed he attempted to board it, evidence of defendant's rules, providing that the regular stopping place was on the opposite side of the street from that where plaintiff claimed the car stopped, was admissible in support of the testimony of the operatives that it did not stop at the place claimed. (*Moffitt v. Connecticut Co.*, 86 Atlantic Rep., 16.)

Colorado.—Fender Not Dropped in Emergency.

Where a woman stepped in front of a moving street car only a few feet away and was struck almost the instant that she was on the track, it was not negligence for the motorman to fail to drop the fender, for the human mind is not held to such a high degree of diligence in the face of unforeseen contingencies. (*Liutz v. Denver City Tramway Co.*, 131 Pacific Rep., 258.)

Florida.—Accident to Unregistered Automobile—Liability to Occupants.

The mere fact that no license had been procured for an automobile does not relieve from liability one whose negli-

gence injured a passenger while riding in the automobile on the public highways of the State.

The negligence of a chauffeur in driving an automobile is not in general imputable to a person who is riding in the automobile but has no authority or control over the machine or the driver. (*Porter v. Jacksonville Electric Co.*, 60 Southern Rep., 188.)

Georgia.—Alighting from Slowly Moving Car.

It was not negligence per se for a passenger to attempt to alight from a slowly moving street car, although he may have been an old and infirm man. Whether his act was so obviously dangerous as to prevent a recovery for an injury received in attempting to alight must be determined by the jury, from all the facts of the case. (*Savannah Electric Co. v. Johnson*, 16 Southeastern Rep., 1059.)

Indiana.—Trespasser on Interurban Tracks.

A traveler who negligently enters on an interurban railroad company's track is not excused from exercising care for his own safety after that time and before collision with a street car, and where he has an opportunity to leave the track and avoid injury he must do so, and where his negligence continues to the very time of injury and concurs with the negligence of the railway company the doctrine of last clear chance is inapplicable. (*Terre Haute, I. & E. Traction Co. v. Latham*, 101 Northeastern Rep., 746.)

Iowa.—Injuries in Alighting.

Where the car was started while a crippled passenger was alighting in the conductor's presence and view, the company would be liable for resulting injuries, though such passenger had already been allowed a reasonable time to alight. (*Mitchell v. Des Moines City Ry. Co.*, 141 Northwestern Rep., 43.)

Kansas.—Intending Passenger Asleep on Track.

One who carelessly sits down upon the ties of an interurban electric railway track to await the arrival of a car is not continuously and concurrently negligent by reason of becoming unconscious from sleep or coma and thereby unable to avoid injury from a car wantonly run upon him. (*Tempfer v. Joplin & P. Ry. Co.*, 131 Pacific Rep., 593.)

Kentucky.—Injury to Passenger Standing on Steps.

A street car passenger is not chargeable with contributory negligence in remaining on the steps from which he is thrown by the negligent operation of the car, where he is compelled by the crowded condition of the car either to ride there or shove his way to the crowded platform. (*South Covington & C. St. Ry. Co. v. Hardy*, 153 Southwestern Rep., 474.)

New Jersey.—Collision with Fire Apparatus—Effect of Ordinance.

The driver of a fire apparatus, on the way to a fire, approached a street upon which he knew cars were running at frequent intervals, and his management of the team of horses drawing the apparatus was such that he was guilty of contributory negligence in colliding with a trolley car, unless a city ordinance which made it a misdemeanor for any one in or upon or owning any vehicle to refuse the right-of-way or in any way obstruct any fire apparatus abrogated the rule relating to contributory negligence and thus excused him from the application of the rule. Held, that such an ordinance, which simply imposes a liability for the non-observance of its terms, does not abrogate the rule relating to contributory negligence. (*Woods v. Public Service Co.*, 85 Atlantic Rep., 1016.)

South Carolina.—Ejection by Fellow Passenger—Liability of Railway Company.

A passenger sued for injuries from being ejected from an electric car by a fellow passenger, and the evidence showed that the conductor saw plaintiff thrown off, if he did not assist in doing it, and afterward saw him following the car for some distance but did not attempt to stop to let him on again. Held, that the court did not err in refusing to modify plaintiff's request of instruction that a common carrier may be held for damages unless it exercises the highest degree of care to protect its passengers from the violence of other passengers by adding thereto that the rule stated applies only when the carrier knows of the danger or of facts from which the danger may be reasonably anticipated. (*Dennis v. Columbia Electric St. Ry., Light & Power Co.*, 76 S. W. Rep., 711.)

News of Electric Railways

Western Society Discusses Chicago Subway Plans

Some time ago the Western Society of Engineers appointed a committee to collect copies of the various reports on the subject of subways for Chicago, abstract them and present them in the form of a bulletin at the first regular meeting held Sept. 8, 1913. At the conclusion of this committee's report at the date named a number of engineers discussed the various lines and routings. The subject will be brought before the society again at a later date for the discussion of the engineering problems which will be involved in the construction.

Alderman Block, chairman of the local transportation committee of the Chicago City Council, addressed the engineers. He stated that there was little doubt that rapid transportation was needed for Chicago, but urged careful consideration of the problem. He did not believe in a partial subway system to relieve either the surface or the elevated railway congestion in the loop district. He favored through routes from east to west. To build subways for surface cars would not relieve transportation congestion except where short sections of subway were required to permit the surface cars to pass under the river or under steam railroads. The surface lines should serve as feeders to the subway system, the stations of which should be a half mile to a mile apart. The general opinion was that most of the reports tended to increase or concentrate congestion in the loop district and that the proper way to solve the problem was to build the subways through the loop or around it.

Extent of Damage to Utilities in Fire at Hot Springs

The public utilities of Hot Springs, Ark., suffered severely in the fire on Friday, Sept. 5. The power plant of the Citizens' Electric Company was destroyed soon after the fire started. As a consequence the city was thrown into darkness and the electric railway service had to be suspended.

The power plant was in flames two hours after the fire started. Stephen E. Dillon, general manager, and his assistants managed to save the records of the company, which were in the general office adjoining the power plant proper. What records were not brought out before the fire reached the building were placed in the vaults and remained intact. The power house engineers remained in the power plant until the fire reached the building. This they did to handle the electric service for the pumps pumping the water supply from the distant reservoir. The auxiliary steam pumps at the water works, 2 miles distant, had been put into service in the meantime and there was no delay in supplying the fire lines with water.

As soon as the fire chief at Hot Springs saw that the blaze was beyond control, a hurry call was sent to Little Rock, 55 miles distant, for aid, and fire engines, hose carts and chemical engines were hurried to Hot Springs. Shortly before midnight the firemen succeeded in heading the fire toward the mountain side, with the result that it finally burned itself out.

A hurried survey of the power house when the fire had cooled down showed that the 1250-kw turbine could be rewound, but that the 450-kw and 500-kw units would probably be a total loss. The motor-generator set and rotary converter will have to be replaced by new equipment. One condenser will soon be put into operating condition, but the other will be a loss. Most of the piping was destroyed. Two of the Stirling boilers can be repaired, but it is not thought that the rest of the battery of boilers can be used again.

Traction service was resumed at once with two gasoline motor buses, and mules were hitched to the lighter street cars.

The executive, engineering and purchasing departments of the Federal Light & Traction Company, New York, began immediate preparations to rush equipment to Hot Springs. Telegrams were sent to all parts of the country tracing turbines and other equipment, either new or second-hand, to replace the equipment which was destroyed.

The city is without electricity and there is only a partial telephone service. It is thought that a new central station will be built on another site a mile from the location of the old plant, which was in the business section.

C. C. Chappelle, vice-president and general manager of the Federal Light & Traction Company, has personal charge of the rebuilding of the power plant, etc. W. A. Haller, chief engineer and general superintendent, is in charge at the scene of the disaster. George J. Gauthier, general construction superintendent, as assistant is in active charge of the two score of linemen and others engaged in the work of rebuilding the company's property.

The Federal Light & Traction Company, New York, acquired the Citizens' Electric Company, the Consumers' Gas Company, the Hot Springs Street Railway and the Hot Springs Water Company in March, 1913.

Pittsburgh Subway Discussion Reopened

The City Council of Pittsburgh, Pa., in its conference on Sept. 4 with Mayor Magee, members of the law department, and A. O. Fording, of the Pittsburgh Subway Company, decided that the new subway ordinance will be considered as a whole, carrying the name of the Pittsburgh Subway Company. A proposal to consider the bill in blank, with the name to be inserted later, was defeated. As it stands the bill presented was taken up section by section. The law department will now consider the bill, and the Chamber of Commerce will be asked to pass on its merits. The main idea now is to redraft the ordinance so as to include terms that can be agreed upon by the subway company, the Council and the Mayor, each of which had varying views on the ordinance that was passed by Council, vetoed by the Mayor and killed because there was not the two-thirds majority necessary to repass it over the Mayor's objections. Some objection was raised on Sept. 4 to the fixing of a 5-cent fare limit. Mr. Garland's motion to make a 5-cent limit prevailed and was finally agreed to.

J. D. Mortimer on Interurban Development

James D. Mortimer, president and general manager of The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., is quoted by the Milwaukee *Wisconsin* as follows:

"The decrease in development of interurban electric railway systems during the last few years, as shown by statistical reports of growth of electric railway mileage, has caused inquiries in various quarters as to the reasons for this lack of development. Relatively little new interurban mileage has been constructed in Wisconsin in the last three years. There has likewise been relatively little increase during recent years in Ohio, Indiana, Iowa and Michigan. Inquiry at the office of the Railroad Commission of Wisconsin tends to show that none of the interurban lines in the State of Wisconsin are what might be called paying investments.

"It is true that very few interurban electric railways have proved either paying or profitable investments. A recent analysis of the interurban lines operated by The Milwaukee Electric Railway & Light Company and Milwaukee Light, Heat & Traction Company indicates startling figures. After providing a fair allowance for operating expenses and depreciation, the earnings of the Milwaukee-Watertown line are about 3.6 per cent return on the tangible property, excluding any allowances for the development of the business or accrued deficits in operation, and using the valuation of the physical property as determined by the engineering staff of the railroad commission. Under the same conditions the earnings of the Milwaukee-Racine-Kenosha line have not exceeded 3 per cent upon construction cost. The Milwaukee-St. Martins-East Troy line has not earned operating expenses and depreciation. These conditions are typical of many others throughout the country. They show clearly why it is most difficult to obtain the capital required for the construction of interurban railways when there are so many other investments yielding

very much higher rates of return and not possessing the hazard that is inherent in this business. Few men would embark in an industrial enterprise expecting to make much less than 10 per cent per annum on their money. With many opportunities for such investments it is not unnatural that capital does not flow into the electric railway business.

"For our own part we are not planning to make any extensions to our interurban lines unless conditions change so as to allow the capital which we have already invested to earn something more than government bond interest. This situation is brought about by the insufficiency of patronage and fares. The expenses of such lines are fixed to a large degree. Under state and local laws taxes and other obligations are set and must be met, and under franchise conditions and decisions interpreting them other items of expense are imposed, and labor and material follows the market which has steadily climbed upward for many years. That fixes the expenses. They can be met only by earnings.

"In order to bring the properties into the earning class there must be a more equitable condition of affairs. This condition can only be approximated by the readjustment of passenger fares so they will bear a more just relation to the cost and value of the service rendered. Another improvement in conditions could come through a better use of the lines by the community. As it is now there are thousands of acres of good market gardening and dairy land about Milwaukee that are not served by transportation lines, and as a consequence lie fallow waiting the real estate man, or are devoted to general farming. With the electric lines carrying produce to the city markets that land could be developed and the city people could obtain their produce at lower prices than now obtain."

Strike in Dublin

At 10 o'clock on Aug. 26, the first day of the horse show, many of the motormen and conductors of the Dublin (Ireland) United Tramways deserted the cars in the vicinity of the Nelson Pillar, Sackville Street, which is the starting point for a large number of the lines. Others waited until they had brought their cars to the depots. Altogether about 140 motormen and conductors struck, together with about forty other employees, chiefly men at the company's shops. A large force of Dublin police and constabulary took up positions at important points in the city's thoroughfares. Mounted police patrolled the main line of traffic to the show grounds. Twenty-five drivers and conductors were immediately arrested for leaving their cars on the line, and later were remanded for a week on bail. The company brought up reserve men, and after an hour or two maintained a nearly normal service, but no cars were run after dark.

On Aug. 27 conductors and motormen left the company's service on the Kingsbridge route and, assembling at the terminus of the electric railway at the Great Southern & Western Railway Station, evinced a spirit of intimidation toward the men who continued to remain on duty. The service was consequently restricted.

Early on the morning of Aug. 28 James Larkin, secretary of the Irish Transport Workers' Union, and four other Irish labor leaders were arrested and charged with seditious libel and conspiracy. The senior divisional magistrate sent the case forward for trial, the defendants being released on bail after making an agreement not to make inflammatory speeches meanwhile. Larkin nevertheless advised his followers to hold a meeting on Aug. 31. That was the beginning of trouble, which culminated in wild rioting by the mob and baton charges by the police. Ambulances were called and soon every hospital bed in the city was occupied. More than 400 people were treated, and several cases had to be turned away. Two men died in the hospital of fractured skulls.

The strike meeting was proclaimed by the police on Aug. 29, but Larkin publicly burned the proclamation that night and declared he would appear in Sackville Street, dead or alive. He drove up to the Imperial Hotel in disguise and made a dramatic appearance on the balcony. A score of constables entered the hotel. Larkin was arrested and after that the rioting continued all day.

James Keir Hardie, socialist and labor member of Par-

liament, was in Dublin on Sept. 2 in connection with the strike and the conflicts between the strikers and the police. He is reported to have said:

"I regard what has happened as the most serious event the trades union movement has had to face for at least a century. The action of the authorities against the strike leader James Larkin and others sweeps aside the whole of the trades union legislation and restores us to the exact position in which the trades unions were before they were legalized."

In both London and Dublin demonstrations were held on Sept. 8 to protest against the conduct of the police on the occasion of the strike riots in Dublin. Trafalgar Square, London, held an orderly crowd, perhaps 8000 strong, and a parliamentary inquiry was demanded. A more impressive assembly gathered in Sackville Street, Dublin, where 50,000 persons congregated.

President Elliott on New Haven Policies

In a statement which he made on Sept. 6 in regard to the policies of the New York, New Haven & Hartford Railroad, Howard Elliott, the president, said in referring to the application of the company to the Massachusetts authorities to issue bonds and to the relations of Mr. Mellen with the company:

"The company is now asking permission from the public authorities to issue certain debenture bonds, for the purpose of financing itself, and it hopes to obtain that permission, and in that way receive \$67,552,000, which will be used to pay off notes and bonds falling due within the next few months of \$46,023,750, leaving the balance of \$21,528,250 for the class of expenditures mentioned. If it cannot get the money it cannot do the work, so that it would appear to be to the interest of the public as much as to the interest of the railroad to have the proposed plan go through promptly, even if some disagree on the question of what is the best way to raise the money. That is a question of judgment, and the directors in making up their plan did what they thought was safest and wisest at the time to protect the present and future of the property.

"Morris McDonald is president of the Boston & Maine and Maine Central railroads; he and his organization will devote their entire time and attention to managing, operating and developing those properties. When the by-laws of the New Haven road are changed, Vice-president Hustis will become president of that property. He and his staff will devote their entire time and attention to that property. I have recommended to the board of directors of the New York, Ontario & Western Railroad that they select a man for president of that road, so that he and his staff may devote their entire time and attention to that property. As chairman, I shall do all I can to help, by suggestion, consultation, personal inspection and co-operation with the officers and men. The important point, however, is that each organization will have only its own affairs to look after, will be accessible to the public, will spend considerable time on the road, and will be able to decide nearly all questions promptly, and, in consequence, can give closer supervision to all details, get closer to the men, and thus gradually give better and safer service to the public, and help to build up the business of the country, and consequently of the railroad. Later on, when the subject can be reached, the question of handling other properties in which the New Haven road may be interested will be taken up, but the most important matter now is the New Haven, and to that Mr. Hustis will devote all of his time, and I will give the major portion of mine for the present.

"There seems to be a slight misunderstanding as to the relations that Mr. Mellen has to the present management. When I went to the Northern Pacific Railroad Mr. Mellen very kindly told me that he would be glad at any time to give me any information that he had concerning that property, and once or twice I called upon him. When I came here he very kindly made the same offer, but he has retired from office and from the board and has no connection, directly or indirectly, with the present and future policy or the management of the New York, New Haven & Hartford Railroad or of any of its various properties, or in the selection and direction of any officers working for any of these properties."

The Boston Arbitration Hearings

After a short suspension over the Labor Day holiday, the arbitration hearings in the Boston Elevated Railway labor investigation were resumed on Sept. 2. The week ended Sept. 6 was almost entirely occupied by witnesses from the ranks of the company's employees. The striking development of the week was the admission for publication by the company under request of counsel for employees and by ruling of the board of arbitrators of the salaries of all its officers. The list included fifty-one persons. The list of official salaries totals \$279,620, and the statement issued by the company shows that this represents an increase of about \$40,000 in the last four or five years.

The testimony presented during the week by employees dealt mainly with conditions experienced and wages obtained by individuals in the company's service, explanations of the use of the working lists in carhouse lobbies, detailed accounts of conductors' duties on runs, and an exposition of the work of ticket sellers, presentation of operating rules, outline of employees' training in the pronunciation of streets, and the typical filling out of accident reports. These matters were presented with the object of showing that the responsibilities and duties of the individual have increased within the past few years. The company's minimum wage guarantee of \$12 was criticised on the ground that it interfered with individual maximum earning power. It was brought out that the company has about 300 women ticket sellers in its employ, of whom about forty are extras. One of the former testified that her daily receipts are from \$200 to \$300 and that her weekly wage is \$9.72, of which 60 cents is carfare allowance. Tickets are sold from reels holding 5000 each, and a girl can sell about 1000 in an hour, maximum. All transfers are now stamped with the conductor's number to facilitate tracing mistakes. Evidence was presented to show the care taken by the company to insure courtesy by conductors.

It is anticipated that another week will be required to finish the presentation of the employees' side in the hearings, which have now been under way for substantially a month. The board was occupied in the week beginning Sept. 8 with the testimony of individual employees regarding wages and working conditions, as in the preceding week. Evidence was offered to the effect that a motorman's responsibility is greater than formerly. Each motorman on the surface lines is obliged to be posted on 124 rules, sixteen police regulations, sixteen statutes, three Board of Health regulations and six city ordinances, in addition to forty-nine general orders posted in 1913 to date and almost daily bulletins. Numerous details were presented as to the itemized bill-of-fare maintained in a representative employee's household, and much cumulative testimony was offered to demonstrate the limited resources of car-service employees, ticket sellers and porters in a pecuniary way as generally prevailing. Several witnesses expressed a preference for a minimum guarantee of a daily rather than a weekly wage. The difficulty of assigning acceptable amounts of work from the extra list was also set forth.

An itemized tabulation presented for the first eight months of the current year by a surface line conductor showed that this employee had worked 234 days, taken in \$6,579 in cash and 17,957 transfers, and had received for this service \$608. He had registered 149,542 passengers. A comparison of his work in twenty-one days of August, 1907, with that accomplished in the first fifteen days of August, 1913, showed that in the former period he had handled \$489 in cash and 496 transfers as against \$498 in cash and 1472 transfers in the latter time. Evidence was offered by the men to the effect that the present schedules do not allow adequate time for loading surface cars at the Dudley Street terminal. It was charged that the Boston public is growing more negligent in notifying motormen before boarding cars. The oiling of streets was also cited as an added difficulty from the motorman's standpoint. The contention was advanced by several witnesses that time spent in the lobby on call of the company should be compensated for by a guarantee of at least seven hours' daily pay. Regarding the number of daily brake applications, one motorman with a fifty-minute run and making about 100 regular stops estimated that in the course of a full day's work he was obliged to make 900

dead stops and to apply the brakes 1500 times, including slow-downs.

Testimony was presented by an extra man who has been employed fifteen months by the company to show that two or three extra men are assigned to a carhouse for a 5 a. m. report daily; that several more report at 6 a. m., and all the rest at 7 a. m. The extra man assigned to report early holds his privilege of getting the first work given out. At 7 a. m. he falls into his regular rating, according to seniority, so that in many cases a man reporting at the later hour may obtain work ahead of one reporting earlier, according to conditions. The extra man who fails to get work at 7 a. m. is obliged to remain in the lobby until 9.15 a. m., when the general roll-call is held. Most of the men excused after the roll-call are required to report again at 11.45 a. m., when the early report men may be excused an hour for dinner. Other roll-calls are held at 3 p. m. and 6 p. m. Men obtaining no work at the last are then excused for the day. Many extra men average the \$12 minimum wage per week guaranteed by the company.

J. Henry Neal, general auditor of the company, presented a statement at one of the later hearings showing the actual earnings of 3733 representative blue-uniformed men, classified as follows:

Cents per Hour	No. of Men	Total Wages Four Weeks Ended Jan. 31, 1913	Average Earnings per Week
28.2	610	\$42,315.81	\$17.34
28.2	357	24,292.51	17.01
27.5	577	37,525.64	16.25
26.8	673	39,461.19	14.62
26.2	539	28,971.85	13.43
25.6	977	47,591.56	12.17
Totals.....	3733	\$220,158.56	Avg....\$14.76

Regarding this tabulation Mr. Neal said that it had been prepared for the information of President Bancroft, and that it did not include the records of men absent two days or more per week, but included overtime, extra trips and instructors' time. Last year the company paid \$70,000 on account of the guaranteed minimum wage, which was not earned by platform labor. About 40 per cent of the blue-uniformed employees are extra men.

Removing the Historic Astor House

One of the oldest landmarks in New York City is to be removed soon to allow the construction of the new Broadway subway. This is the old Astor House, which stands on the west side of Broadway between Vesey Street and Barclay Street and which dates from 1836. It is a massive stone building six stories in height. It is owned one-half by William Waldorf Astor and one-half by the estate of John Jacob Astor, now controlled by Vincent Astor. The route of the proposed subway which is to be operated by the New York Municipal Railway Corporation, after running down Broadway from Forty-second Street, turns to the west between Barclay and Vesey Streets and curves under the southern half of the Astor House, crosses Vesey Street, passes under a corner of St. Paul's Churchyard and continues south through Church Street and Trinity Place. This deflection was necessary to avoid building the new subway below the existing subway which occupies that part of Broadway. It was decided that the southern half of the Astor House must come down and the city accordingly entered into an agreement with the John Jacob Astor estate for the necessary easement. Under this agreement the city pays the estate for the rights needed and agrees to construct caisson retaining walls upon the Broadway and Vesey Street fronts of the plot, so that the subway will be protected and the erection of a modern building upon the site will be possible. The commission has awarded the contract to remove the southern half of the Astor House to a company, which agrees to tear down the building and remove the debris within fifty-five days and to pay the city \$3,833 for the privilege.

Meeting of the Illinois Electric Railways Association

The members of the Illinois Electric Railways Association will meet at Starved Rock, Ill., on Sept. 19. A special train will be run from Joliet to Starved Rock over the Chicago, Ottawa & Peoria Railway. Starved Rock is in the "Illinois Valley Wonderland."

Damages for Intangible Losses in Jersey City Not Allowed

On Sept. 5 the verdict of \$43,300 damages to Wells Fargo & Company against Jersey City for damages sustained by the express company during the Jersey City strike in 1910 was reduced by Judge Rellstab in the United States District Court to \$300. A digest of the briefs submitted to the court and a history of the previous jury decision on May 10, 1913, were published in the *ELECTRIC RAILWAY JOURNAL* of Aug. 2, 1913.

The original award was \$300 for damages to the tangible property of the company and \$43,000 for damages to the intangible property or business. The gist of the present decision is that the business of the express company was not properly within the provisions of the act to prevent riots, riots and tumultuous assemblies. In other words, the court held that the act imposing liability upon cities for damages during riots included only tangible property.

At the original trial the question of the city's liability for loss of business was left open, the jury being directed to return a verdict upon the assumption of full liability on the part of the city, but so to divide the verdict that the loss to physical property and to business might be clearly differentiated.

In fixing the total liability of the city at \$300, covering only physical damages, the court points out that the riot act invoked by the express company imposes upon municipalities a liability unknown at common law. Therefore, in spite of claims by the company and an exhaustive citation of cases to show that the act is remedial in character and hence to be liberally construed, the court insists that the strictest construction must be placed upon the act in order that no liability may attach to the municipality further than that clearly prescribed and intended by the Legislature. Construing the language of the act in this light, the court holds that the word "property" was not used in its most general sense, but was meant to include only the physical, tangible property located within the municipality in which the rioting might occur.

Hearing on Application for Extension in Toronto

The hearing of the city of Toronto's application for extensions of the lines of the Toronto Railway will be resumed by the Ontario Railway & Municipal Board on Sept. 18. The municipality contends that the company is not giving the best possible service by reason of the lay-out of its tracks. It desires the company to extend the tracks on Bloor Street westward to the northern entrance of High Park and build a line on Pape Avenue and one on Christie or Dufferin Street. The city's evidence has all been presented. The lawyers for the railway, it is said, expect that the presentation of their case will occupy about nine days.

Mayor Hocken, on Sept. 5, received a letter from R. A. Ross, Montreal, who was engaged to value the franchise and assets of the Toronto Electric Light Company, stating that his report would not be ready for two or three weeks. The Mayor immediately urged the engineer to hasten the work "as the matter must be submitted before January." The Mayor stated that the report on the street railway valuation would be ready in a week. He would like to have both reports at the same time.

Comptroller Church has failed in an effort to have the Toronto Board of Control resolve that "the by-law (if any) for the purchase of the property of the Toronto Railway and Toronto Electric Light Company be submitted to the ratepayers on Jan. 1 next." Mr. Church said that date was the proper time and the only legal time to vote on the by-law. Mayor Hocken said the issue would become involved with the civic election. He suggested that the point of law raised be referred to the city solicitor. Mr. Church, however, insisted on a division on his motion, which was lost.

Formal Opening of Oakland, Antioch & Eastern Railway

The formal opening of the Oakland, Antioch & Eastern Railway was celebrated on Sept. 3 with an elaborate program. On that day the schedule of eight trains daily between Sacramento and San Francisco became effective.

On Aug. 30 a two-car train, "The Stockholders' Special,"

was run through from San Francisco to Sacramento, a distance of 91 miles. The trip was made in three hours and ten minutes, the running time being less than that on any of the steam lines between these points. The J. G. White Companies were well represented on this trip by the members of the San Francisco office.

The Shepard Pass tunnel, built for this road, and located about 5 miles from Oakland, is nearly two-thirds of a mile long, the longest thus far constructed in this country for an interurban electric railway. The new road is equipped with electric locomotives and steel cars, including Pullman and observation cars.

The distribution system from the railway substations is 1200 volt d. c., with overhead catenary construction. The power is supplied by one of the large hydroelectric companies whose lines intersect the railway.

New Texas Road Opened.—The Texas City (Tex.) Street Railway has completed the construction of its line in Texas City and the road has been placed in operation. The line is a short one and power is supplied from the plant of the Texas City Transportation Company.

Electrification Vote at London, Ont.—Mayor C. M. R. Graham, London, Ont., announced that the vote on the plan of Adam Beck, of the Hydroelectric Power Commission, for the rehabilitation and electrification of the London & Port Stanley Railway will be taken before Oct. 15.

New Route Between New York and Boston.—The Shore Line Electric Railway has completed and placed in operation the extension of its line from Saybrook to New London, Conn. The completion of the line makes it possible to travel all the way by electric railway between New York and Boston via New Haven and New London. The one route by trolley heretofore between Boston and New York has been via Hartford, Springfield and Worcester.

Abolishing the Commerce Court.—The House of Representatives on Sept. 9 passed the Bartlett amendment abolishing the five additional circuit judgeships created at the time of the passage of the Commerce Court act, thereby legislating out of office, so far as the House could do so, the five judges appointed under that act. It is stated that this is the first time the office of a judge has been abolished since the legislation growing out of the "midnight appointments" in the administration of John Adams. The amendment adopted on Sept. 9 is in the general deficiency appropriation bill and must be agreed to by the Senate.

Bill for Municipal Ownership in the District of Columbia.—A bill providing for the municipal ownership and municipal operation of all street railways in the District of Columbia has been introduced in the House by Representative Crosser of Ohio, a member of the District committee. The bill provides a way for the District Commissioners to buy all the street railways in the city and to turn them over to the Public Utilities Commission to operate. Immediately upon the enactment of the bill the commissioners would be directed to negotiate with the street railways for the purpose of arriving at an agreement as to the price to be paid, the funds for the purchase to be raised by the issue of thirty-year 3½ per cent bonds.

Dragging the Railroad Question Into Politics in Massachusetts.—In a statement which he issued on Sept. 6 announcing his platform as a candidate for the Democratic nomination for Governor, Lieut. Gov. David I. Walsh declares the railroad question the overshadowing problem of the hour in Massachusetts and the rest of New England. As a remedy, he urges that the State should exercise its reserve power under the charter of the Boston Railroad Holding Company, by which it may take over the assets of that corporation, which are the controlling shares of stock in the Boston & Maine. He said: "The Democracy of Massachusetts should notify the New Haven Railroad that if it accepts the authority recently so unfortunately given it to acquire any more street railways in this Commonwealth it will be inviting more trouble than those electric railways can ever be worth to it, and if it still blindly persists we should immediately revoke the so-called electric railway merger act."

California Cities to Aid Traction Lines.—At a meeting held on Aug. 27, at the office of the Mayor of Oakland, Cal., officials of Oakland, Alameda, Richmond, San Leandro and

Hayward decided that they would not press the San Francisco-Oakland Terminal Railways for extensions of lines, changes of schedule or maintenance of pavement between the tracks until the company has been refinanced. John S. Drum, president of the Savings Union Bank & Trust Company, San Francisco, a member of the Smith advisory committee; W. R. Alberger, general manager of the company, and Gavin McNab, attorney for the United Properties Company, the holding company of the San Francisco-Oakland Terminal Railways, asked for time on the basis of all that the traction company had accomplished for the bay cities. The Mayors of Berkeley and Piedmont declined to join with the other executives in assurances that their cities would be as reasonable as possible in their demands. They were in favor of compelling immediate action on penalty of the road losing its franchises.

Proposed Extension of Corona Rapid Transit Line.—Edward E. McCall, chairman of the Public Service Commission for the First District of New York, has written to Theodore P. Shonts, president of the Interborough Rapid Transit Company, asking him to inform the commission whether his company, as lessee under the dual system contracts, will accept and operate as part of the new subway system the proposed extension of the Corona rapid transit line from Sycamore Avenue, Corona, to Main Street, Flushing. This extension was decided upon after the dual system contracts were signed. Under those contracts the Corona route ends at Sycamore Avenue, but the extension provides for a continuation of it across Flushing Creek and through Flushing. Now the commission is willing to have the city construct this extension as far as Main Street, Flushing, and in accordance with the contract terms gives the Interborough Rapid Transit Company the right to say whether it will include such extension for permanent operation, under the terms of the contract.

Inquiry Into Indifference of New Haven Company Toward Commission Order.—The Public Service Commission of the First District of New York has demanded of the New York, New Haven & Hartford Railroad to know why the company has not complied with an order of the commission served upon it in April last. The order was general to all electrical companies and companies using electricity. It prescribed general rules "to insure safety of employees of electrical plants." All railroads and public utility companies have complied with this order and submitted a code of rules to be followed except the New York, New Haven & Hartford Railroad. This company, it is alleged, has ignored the order. An inquiry instituted by the Public Service Commission in this connection has been adjourned until Sept. 15, at the request of the Public Service Commission of the Second District of New York. The members of the Public Utilities Commission of Connecticut have been invited by the members of the New York commissions to be present at the inquiry.

Advance Registration Cards for A. E. R. A. Convention.—The American Electric Railway Association is sending to the executive officials of member companies a supply of cards covering advance registration on account of the convention to be held in Atlantic City, Oct. 13 to 17. The association desires to have the cards filled out for such representatives of the company which is addressed as will attend the meeting and to have the cards returned to the association office. It is explained that prompt attention to this matter will facilitate greatly the registration at the convention and save the time of the delegates when they arrive in Atlantic City. The card should set forth the particular association with which the representatives desire to register, the memorandum on the back of the card serving as a general guide to the establishment of the delegate's proper affiliation. It is not intended, however, that the division of officials between the associations as shown shall be inflexible, the member companies, of course, reserving the right to have their representatives register with such affiliated association as they may elect.

Reorganization of County Traction Company.—The Evanston Traction Company, recently incorporated, to which was granted a new twenty-year franchise by the city of Evanston, Ill., has reorganized the operating department of the County Traction Company, of which it was a part. Mention was made in the *ELECTRIC RAILWAY JOURNAL* of

Aug. 23 of the terms of the franchise of the company. This grant is similar to the Chicago settlement ordinance of 1907, in that it provides two supervising engineers, one representing the company and the other the city of Evanston. Clement C. Smith, Milwaukee, Wis., is president and general manager of the new company, and R. E. Belknap, representative of the Pennsylvania Steel Company in the Western territory, is vice-president. George Allison is secretary and treasurer and L. A. Gilbert has been made superintendent in charge of operation with J. J. Lewis as auditor. Michael Kreds has been appointed superintendent of construction and supervising engineer representing the company, and J. Moore has been appointed supervising engineer for the city of Evanston. Considerable track rehabilitation work is under way. All the joints will be raised and electrically welded. The rehabilitation work will be continued more extensively next year. Plans and specifications are being prepared for ten double-truck, double-end, pay-as-you-enter cars. Up to the present time the new company has rented its rolling stock from the Chicago Railways and power is furnished by the Northwestern Elevated Railroad.

Important Steps in Connection with New York Rapid Transit Work.—A public hearing has been set by the Public Service Commission of the First District of New York for Sept. 26 on the form of construction contract to be used for the building of Section 1 of the Whitehall Street-Montague Street route of the Brooklyn Rapid Transit Company. This will connect the southern end of the Broadway subway at Trinity Place and Morris Street with the Manhattan end of the Brooklyn Rapid Transit tunnel to be run under the East River to Brooklyn. The plans for the tunnel itself are not yet ready, but the engineers of the commission have been at work on them for several weeks. The commission has adopted a form of contract and will begin to advertise for bids on Section 2 of the Seventh Avenue line of the Interborough Rapid Transit Company. The Seventh Avenue line will leave Times Square at about Forty-third Street and run down Seventh Avenue and Varick Street to West Broadway. At Park Place it will send off a two-track line, which will go by Beekman Street and William Street to Old Slip, whence it will join a tunnel under the East River. The section which it is proposed to begin constructing immediately begins at the intersection of Greenwich Street and West Broadway, and extends up West Broadway, and Varick Street nearly to Beach Street. Moreover, it will take in the beginning of the Park Place line. Bids on this section are to be opened on Oct. 1. The plans for the northern end of the Seventh Avenue line, where it joins the present Subway in Times Square, are not yet ready.

John R. Graham as Host.—A party of twenty-three Boston men, several of whom were members of the rapid transit committee of the Massachusetts Legislature of 1893, were the guests recently of John R. Graham, Bangor, who served on the rapid transit committee while a member of the House from Quincy. Mr. Graham is now president and general manager of the Bangor Railway & Electric Company, Bangor, Me., and an officer of a number of other utilities. A dinner was held at which brief addresses, some of a reminiscent vein and others in relation to the electric railway development of Maine and New England, were made by Governor Haines, Mayor Newbert, Mr. Graham of Bangor, Jeremiah J. McCarthy, formerly surveyor of the port of Boston; ex-State Treasurer Edward P. Shaw of Massachusetts and John Quinn, sheriff of Suffolk County. Ex-Representative Frank P. Bennett of Saugus was toastmaster. Of the members of the rapid transit committee of the session of 1893 two have died and two others, ex-Senator Frank W. Kittredge and ex-Senator Edward J. Leary, city messenger of Boston, were unable to be present. The members of the committee present were ex-Senator Charles H. Baker, of Lynn, and ex-Representative Frank P. Bennett, of Saugus, who was the House chairman of the committee; Salem D. Charles, of Boston, chairman of the street commission of that city; Fred W. Bliss, of Boston; George H. Garfield, of Brockton; John Quinn, of Boston; John B. Newhall, of Lynn; Arthur H. Nutting, of Northampton; Charles H. Varnum, of Lowell; Jeremiah J. McCarthy, of Boston, and John R. Graham, of Bangor, formerly of Quincy. Others in the party were R. S. Goff, vice-president and general manager of the Bay State Street Railway, and E. C. Foster.

Financial and Corporate

ANNUAL REPORTS

Stock and Money Markets

Interborough Rapid Transit Company

Sept. 10, 1913.

The price movement on the New York stock market was upward in the early hours of trading to-day. Around mid-day there were a number of recessions, but a strong tone developed again in the afternoon. The copper stocks continued an exception and failed to record any advance. The final tone was strong. Rates in the money market to-day were: Call, 2½ @ 3 per cent; sixty days, 4 @ 4¼ per cent; ninety days, 4½ @ 5 per cent; four and five months, 5 @ 5½ per cent; six months, 5 per cent.

The Philadelphia market was very quiet and without special feature to-day. Steel was the only issue that was dealt in to any extent.

The trading in Chicago to-day was narrow and the volume of transactions was small.

In the Boston market to-day trading was broad and the volume of transactions was moderately large.

The sales of stocks in the Baltimore market to-day were confined to five issues, the dealings totaling only 540 shares. The demand for bonds was excellent. The transactions were in twelve issues for a total of \$71,600.

Quotations of traction and manufacturing securities as compared with last week follow:

	Sept. 3	Sept. 10
American Brake Shoe & Foundry (common).....	91	91¾
American Brake Shoe & Foundry (preferred).....	132¼	132½
American Cities Company (common).....	33¼	36
American Cities Company (preferred).....	63½	63
American Light & Traction Company (common).....	350	345
American Light & Traction Company (preferred).....	104	105
American Railways Company.....	38¾	38¾
Aurora, Elgin & Chicago Railroad (common).....	41	41½
Aurora, Elgin & Chicago Railroad (preferred).....	a83	82
Boston Elevated Railway.....	89	87
Boston Suburban Electric Companies (common).....	7	7
Boston Suburban Electric Companies (preferred).....	56½	56½
Boston & Worcester Electric Companies (common).....	a10	a10
Boston & Worcester Electric Companies (preferred).....	46	42
Brooklyn Rapid Transit Company.....	89¾	88¾
Capital Traction Company, Washington.....	115½	116½
Chicago City Railway.....	*170	160
Chicago Elevated Railways (common).....	*25	25
Chicago Elevated Railways (preferred).....	*70	75
Chicago Railways, pteptg., ctf. 1.....	95	90½
Chicago Railways, pteptg., ctf. 2.....	32	31
Chicago Railways, pteptg., ctf. 3.....	8¾	8½
Chicago Railways, pteptg., ctf. 4.....	3	2¾
Cincinnati Street Railway.....	a110	a110
Cleveland Railway.....	103¾	103¾
Cleveland Southwestern & Columbus Ry. (common).....	*5½	5½
Cleveland, Southwestern & Columbus Ry. (preferred).....	*30	28¼
Columbus Railway & Light Company.....	18	18
Columbus Railway (common).....	a69½	a69½
Columbus Railway (preferred).....	88	88
Denver & Northwestern Railway.....	*104	104
Detroit United Railway.....	a80	70
General Electric Company.....	145	144
Georgia Railway & Electric Company (common).....	114¾	116½
Georgia Railway & Electric Company (preferred).....	83	83½
Interborough Metropolitan Company (common).....	15¾	15¾
Interborough Metropolitan Company (preferred).....	62	62½
International Traction Company (common).....	*30	30
International Traction Company (preferred).....	*95	a95
Kansas City Railway & Light Company (common).....	*18	20
Kansas City Railway & Light Company (preferred).....	*37	30
Lake Shore Electric Railway (common).....	*5	5
Lake Shore Electric Railway (1st preferred).....	*92	89
Lake Shore Electric Railway (2d preferred).....	*26	24
Manhattan Railway.....	131	130
Massachusetts Electric Companies (common).....	14	14
Massachusetts Electric Companies (preferred).....	70	69
Milwaukee Electric Railway & Light Co. (preferred).....	*95	95
Norfolk Railway & Light Company.....	25	27½
North American Company.....	71½	72¾
Northern Ohio Light & Traction Company (common).....	60¾	63
Northern Ohio Light & Traction Company (preferred).....	100	100
Philadelphia Company, Pittsburgh (common).....	43½	44
Philadelphia Company, Pittsburgh (preferred).....	40	40
Philadelphia Rapid Transit Company.....	22½	23
Portland Railway, Light & Power Company.....	55	55
Public Service Corporation.....	109	109
Tbird Avenue Railway, New York.....	37	38½
Toledo Traction, Light & Power Company (common).....	a30	a30
Toledo Traction, Light & Power Company (preferred).....	a80	a80
Twin City Rapid Transit Co., Minneapolis (common).....	106	107
Union Traction Company of Indiana (common).....	*5	5
Union Traction Company of Indiana (1st preferred).....	*80	80
Union Traction Company of Indiana (2d preferred).....	*20	20
United Rys. & Electric Company (Baltimore).....	27	26¾
United Rys. Inv. Company (common).....	21	21
United Rys. Inv. Company (preferred).....	41	40
Virginia Railway & Power Company (common).....	52	52
Virginia Railway & Power Company (preferred).....	92	92
Washington Ry. & Electric Company (common).....	89½	89½
Washington Ry. & Electric Company (preferred).....	87¾	87¾
West End Street Railway, Boston (common).....	72	72
West End Street Railway, Boston (preferred).....	88	88
Westinghouse Elec. & Mfg. Company.....	71½	72½
Westinghouse Elec. & Mfg. Company (1st preferred).....	114	114

*Last sale, a Asked.

According to the report submitted to the stockholders of the Interborough Rapid Transit Company, New York, N. Y., by the board of directors, the comparative income, profit and loss statement of the company for the fiscal year ended June 30, 1913, is as follows:

	1913	1912
Revenue from transportation	\$31,723,838	\$30,371,834
Other street railway operating revenue.....	774,032	874,558
Gross operating revenue	\$32,497,870	\$31,246,392
Operating expenses:		
Maintenance of way and structures.....	\$1,697,958	\$1,685,653
Maintenance of equipment	2,803,286	2,773,395
Traffic	452	587
Transportation expenses	7,409,942	7,342,703
General expenses	1,349,105	1,245,464
Total operating expenses	\$13,260,743	\$13,047,802
Net operating revenue	\$19,237,127	\$18,198,590
Taxes	2,116,880	1,979,431
Income from operation	\$17,120,247	\$16,219,159
Non-operating income	487,490	†1,305,200
Gross income	\$17,607,737	\$17,524,359
Interest and sinking fund on city bonds.....	\$2,339,483	\$2,312,943
Interest on Interborough Rapid Transit Company first mortgage 5 per cent forty-five year gold bonds	1,692,061	1,617,034
Sinking fund on Interborough Rapid Transit Company first mortgage 5 per cent forty-five year gold bonds	336,291	329,692
Interest on Interborough Rapid Transit Company first and refunding mortgage 5 per cent gold bonds	162,587	.....
Interest on Manhattan Railway consolidated mortgage 4 per cent bonds.....	1,591,080	1,591,080
Interest on New York Elevated Railroad 5 per cent debenture bonds.....	50,000	50,000
Manhattan Railway rental (organization).....	17,500	10,000
Guaranteed dividend—7 per cent on Manhattan Railway capital stock	4,200,000	4,200,000
Amortization of debt discount and expense.....	31,758	97,087
Interest on unfunded debt.....	643,333	786,181
Other rent deductions	6,576	6,576
Total income deductions	\$11,070,669	\$11,000,593
Net corporate income	\$6,537,068	†\$6,523,766
Surplus June 30, 1912, and June 30, 1911.....	8,531,261	6,990,348
Tax refunds and other credits, including in 1913 interest on advances to trustees of New York & Long Island Railroad.....	2,326,542	796,889
Total	\$17,394,871	\$14,311,003
Appropriated for:		
Taxes prior years, amortization, capital retirements and other charges.....	\$121,915	\$529,742
Dividends	4,200,000	5,250,000
Total appropriations	\$4,321,915	\$5,779,742
Profit and loss surplus.....	\$13,072,956	\$8,531,261

†Including first dividend, 15 per cent, \$900,000, on capital stock of Rapid Transit Subway Construction Company.

The gross operating revenue for the year was \$32,497,870, an increase of \$1,251,478, or 4.01 per cent. The gain on the subway division was \$1,114,047, or 7.10 per cent, and on the Manhattan Railway division, \$137,430, or 0.88 per cent. The net corporate income for the year was \$6,537,068, equivalent to 18.68 per cent on the capital stock of the company as against 16.07 per cent for the preceding year and 14.68 per cent for the year previous to that. After the payment of all charges and dividends aggregating 10 per cent upon the capital stock, the net surplus from operations for the year was \$3,037,068. By excluding from last year's earnings the \$900,000 received from a special dividend on the capital stock of the Rapid Transit Subway Construction Company the surplus from the operations of this year shows an increase of \$913,301 over the previous year.

The operating expenses for the year were \$13,260,743, an increase of \$212,941, or 1.63 per cent, as against an increase in operating revenue of 4.01 per cent. The increase on the subway division was \$126,537, or 1.94 per cent, and on the Manhattan division \$86,404, or 1.32 per cent. Included in operating expenses this year is an item of increase in labor cost approximating \$200,000, due to an increase in rate of pay awarded employees of the company as of May 12, 1912. In addition to this there was absorbed in operating expenses and credited to "depreciation reserve" \$184,999 in excess of the amount so set aside in the operations of the previous year. By eliminating, for the purpose of determining the operating efficiency of the two years, the total of these two items of arbitrary increase, operating expenses show an actual decrease of approximately \$172,000. Net

operating revenue was \$19,237,127 as compared with \$18,198,590 last year, an increase of \$1,038,537, or 5.71 per cent, the result of a gain on the subway division of \$87,510, or 10.76 per cent, and a gain on the Manhattan Railway division of \$51,027, or 0.56 per cent.

Theodore P. Shonts, president of the company, says in part:

"The directors declared an extra dividend of 2 per cent during the year, payable out of surplus. Notwithstanding this payment there was an increase of \$4,541,695 in the profit and loss surplus during the year, of which \$2,057,033 represents the interest from July 1, 1909, to March 19, 1913, upon the advances made by the company to the trustees of the New York & Long Island Railroad to provide means for the construction of the Belmont Tunnel and recognized by the Public Service Commission as part of the cost of the construction of the tunnel.

"The total number of passengers carried during the year was 634,316,516, an increase of 27,071,819, or 4.46 per cent, a gain on the subway division of 24,497,654, or 8.08 per cent, and on the Manhattan Railway division of 2,574,165, or 0.84 per cent, the greatest increases being shown at the Grand Central station, with an increase of 2,000,000 in the number of tickets sold, and at the Atlantic Avenue (Brooklyn) station, with an increase of 2,300,000 in the number of tickets sold. The larger gain on the subway division is due primarily to the express service. This service will be inaugurated on all the divisions of the Manhattan Railway as soon as the third tracks recently authorized can be completed.

"The total amount of taxes was \$2,116,880, as compared with \$1,979,431 last year, an increase of \$137,449, or 6.94 per cent, the result of an increase on the subway division of \$25,602, or 7.04 per cent, and on the Manhattan Railway division of \$111,847, or 6.92 per cent. The increase in taxes is principally due to an increase in the special franchise tax. The payment of this tax was made in full, subject to refund in case of a favorable decision of pending litigation.

"The income from operation was \$17,120,247, as compared with \$16,219,159 last year, an increase of \$901,088, or 5.55 per cent, the result of a gain on the subway division of \$961,908, or 10.91 per cent, and a loss on the Manhattan Railway division of \$60,820, or 0.82 per cent.

"The non-operating income was \$487,490, as against \$1,305,200 last year, a decrease of \$817,710, the result of a decrease on the subway division of \$813,384 due to the special dividend of \$900,000 on Rapid Transit Subway Construction Company stock which was received during the previous year, and a decrease on the Manhattan Railway division of \$4,326.

"The gross income was \$17,607,738, as compared with \$17,524,359 last year, an increase of \$83,378, or 0.47 per cent, the result of a gain on the subway division of \$148,523, or 1.47 per cent, and a loss on the Manhattan Railway division of \$65,145, or 0.87 per cent.

"The total income deductions were \$11,070,669, as compared with \$11,000,593 last year, an increase of \$70,076, or 0.64 per cent, the result of an increase on the subway division of \$62,576, or 1.21 per cent, and on the Manhattan Railway division of \$7,500, or 0.13 per cent.

"The net corporate income was \$6,537,068, as compared with \$6,523,766 last year, an increase of \$13,302, or 0.2 per cent, the result of a gain on the subway division of \$85,947, or 1.74 per cent, and a loss on the Manhattan Railway division of \$72,645, or 4.54 per cent.

"The surplus over dividends of 12 per cent (including an extra dividend of 2 per cent) on the capital stock was \$2,337,068. On the basis of 10 per cent dividends for each year and excluding the \$900,000 received during the previous year from a special dividend on the capital stock of the Rapid Transit Subway Construction Company, the surplus for 1913 would be \$3,037,068, as compared with \$2,123,766, leaving \$913,302 as a gain in surplus from operations over the previous year.

"The percentage of operating expenses to gross operating revenue was 40.80 per cent, as compared with 41.76 per cent last year, a decrease of 0.96 per cent, the result of a decrease on the subway division of 2 per cent and an increase on the Manhattan Railway division of 0.19 per cent.

"The balance of the issue of fifteen-year gold mortgage

5 per cent bonds dated Nov. 1, 1907, due Nov. 1, 1952, have been called for redemption and will be paid on Nov. 1, 1913, at the rate of 105 per cent of their face value and accrued interest, upon presentation of said bonds and unmaturing coupons to the Guaranty Trust Company of New York. After that date interest on the bonds will cease.

"On Nov. 1, 1912, the company made the third annual payment required under the provisions of the sinking fund clause of the \$55,000,000 mortgage and deed of trust dated Nov. 1, 1907, viz., \$339,590, and, in accordance with the provisions of the mortgage, the trustee purchased for the sinking fund \$352,000 of the first mortgage 5 per cent bonds costing \$371,870, making a total of the 5 per cent bonds purchased for the sinking fund \$939,000, at a cost of \$985,261."

The report then takes up the question of maintenance of structures, power plant and equipment and of additions, betterments and improvements and gives in detail the work done by the company during the year. The report continues:

"During the past year your company has sustained less fire loss than in any year since the electrification of the elevated and subway lines. There has been no fire loss whatever among the fixed properties, including the carhouses, repair shops, paint shops, oil houses, yards and terminals, which are ordinarily considered to present many special fire hazards. The fire loss on rolling stock has been less than 0.05 per cent of the insured value on both wooden and metal equipment.

"Net income from rented properties has increased this year over last, in spite of unusual expenses for improvements made necessary by the removal of sidewalk encroachments ordered by the city. It is the endeavor of your company to convert into income-producing property all frontages of land that are now in use for storage of material, etc., utilizing the less valuable part or parcels of land for the company's purposes or, where practicable, contracting for cheaper property.

"In accordance with the terms of contract No. 3 requiring this company to produce an assignment to the city of New York for the New York & Long Island Railroad (Belmont Tunnel), preliminary steps have been taken by your company whereby the constructed portion of the tunnel, together with all surviving franchises, consents, permits and property connected therewith, vested in or held by the trustees, will be assigned to the Interborough Rapid Transit Company. The latter company will thereupon, in accordance with the provisions of contract No. 3, execute an assignment to the city, excluding real estate and other property not necessary to the construction, equipment, maintenance and operation of the railway.

"It is proposed, as soon as permission can be obtained from the public authorities to do the necessary work, to place the tunnel in operation so as to give the people of Long Island City better transit facilities and the benefit of a 5-cent fare to and from all points in Manhattan reached by the subway, at the earliest possible date. The equipment for the tunnel has already been constructed and is now in use on other lines, so that there will be no delay in commencing operations as soon as the construction is completed.

"During the year the company voluntarily settled 3063 claims for \$191,950 before any suit was brought, and compromised 385 suits before trial for \$149,836, an increase of 845 claims settled and 132 suits compromised over last year. Notwithstanding this expenditure, however, 703 actions for personal injuries were brought, an increase of 101 actions. The total judgments paid during the year aggregated only \$20,557. The disbursements for claims, suits and damages amounted to 1.11 per cent of the gross operating revenue, and the expenses incident thereto were 0.47 per cent, making an aggregate for the year of 1.58 per cent, an increase of 0.27 per cent of the gross, or \$106,262.

"The second proceeding to determine the question as to whether the company is subject to the state franchise tax on its corporate existence with respect to its operation of the subway has been finally passed upon by the state courts and decided adversely to the company. A writ of error to review this decision has been issued out of the United States Supreme Court, and the extent of the statutory exemption from taxation granted by the rapid transit act will then be finally determined. In the meantime the company

is preserving its right to secure the benefit of any possible cancellation of the assessments by the court of last resort. The taxes as assessed have been paid.

"It is not improbable that a recent decision of the United States Supreme Court involving the liability of leased corporations for the payment of the excise taxes now levied by the United States government, under the act of Congress approved Aug. 5, 1909, will serve to relieve the Manhattan Railway from that obligation and will result in a refund to this company of approximately \$83,000 paid for 1909 and 1910. The matter is now before the United States Commissioner of Internal Revenue.

"The test case brought in the federal courts to reopen on constitutional grounds the claims for damages of owners of property abutting upon the elevated lines, barred by limitation in our State courts, has been decided favorably to this company by the United States District Court. The claims thus barred aggregated several millions of dollars."

The report contains complete details regarding the new subway and elevated improvements which are to be made during the next four years. It states that work on the subway extensions, which was inaugurated on Sept. 20, 1911, and the construction of the Lexington Avenue branch is approximately 31 per cent completed. Work is now progressing favorably in Queens and the Bronx and contracts and specifications on the Seventh Avenue and other branches are now in process of preparation.

The balance sheet of June 30, 1913, show cash on hand amounting to \$1,249,069; subway contribution cash, \$14,844,231; current assets, \$13,883,130; current liabilities, \$5,633,127, and total assets and liabilities, \$123,584,857.

Trenton, Bristol & Philadelphia Street Railway

The statement of income, profit and loss of the Trenton, Bristol & Philadelphia Street Railway, Philadelphia, Pa., for the year ended June 30, 1913, as compared with that for the year ended June 30, 1912, is as follows:

	1913	1912
Gross earnings	\$84,503	\$72,599
Operating expenses	63,435	70,495
Net earnings	\$21,068	\$2,104
Taxes	900	900
Operating income	\$20,168	\$1,204
Interest on funded debt.....	6,766	...
Interest on bills payable.....	\$13,402	\$1,204
	11,738	17,500
Miscellaneous interest (discounts).....	\$1,664	\$16,296
	335	...
Surplus, 1913; deficit, 1912.....	\$1,329	\$16,296

Cape Town Consolidated Tramways & Land Company, Ltd.

According to a report of the directors of the Cape Town (S. A.) Consolidated Tramways & Land Company, Ltd., for the year ending Dec. 31, 1912, after charging London administration expenses, trustees' fees and interest charges, and after crediting interest and transfer fees, a balance of £1,678 is shown to the debit of profit and loss account, which, added to the balance brought forward from 1911 of £4,628, makes a total debit to profit and loss account of £6,306 to be carried forward to next year. No dividends were declared by the subsidiary companies during the year.

The operation of the Camps Bay Tramways during the year under review resulted in a profit of £2,973, against a profit of £1,274 for the year 1911, the number of passengers carried being 139,354 more than in the preceding year.

There is no alteration in the financial position of the company, the directors not having thought it advisable to carry out the proposal made last year for an issue of £50,000 prior lien bonds, nor has there been any necessity to make any further addition to the loan of £10,000 obtained from certain debenture holders against a pledge of £20,000 of this security. The report states that the Cape provincial government has taken the initiative in formulating a scheme for the unification of the municipalities of the Cape Peninsula; such unification will, in all probability, embrace Camps Bay, but during the negotiations the shareholders may rely on the vigilance of the directors that the rights of the company will be protected.

Chicago Traction Merger Question Up Again

As a result of a resolution passed by the Chicago City Council before vacation time, ordering the sub-committee of the transportation committee to try to bring about negotiations between the surface electric railways for a merger, the sub-committee at its first meeting on Sept. 3 took up this question again.

Prior to the adjournment for the summer the sub-committee discussed the matter with L. A. Busby, of the Chicago City Railway, and W. W. Gurley, of the Chicago Railways, and the two railroad representatives declared they would be ready to report in September. Now it is expected that on Sept. 17 Mr. Busby will submit a new plan of joint operation. It is not believed that this plan will provide for a corporate merger between the Chicago City Railway and the Chicago Railways, but merely for operation under a single management, with a 5-cent fare and transfers.

Last May the transportation committee had under consideration a similar proposal, but this was rejected because of the insistence of the companies that if in any year under joint operation the earnings of the companies should be less than under separate operation the deficiency should be made good out of the earnings of future years. The plan to be submitted Sept. 17 will embrace new features which may obviate the objections made against the first proposals.

The Chicago Elevated Railways has, because of the dropping of merger negotiations, been obliged to carry out singly some of the intended merger plans. Should developments arise suggesting the advisability of all the lines and the city working in harmony for the building of subways, there might result consideration of general unification plans.

Financing the Northern Electric Railway

E. R. Lilienthal, president of the Northern Electric Railway, who is now in San Francisco, expects to complete negotiations in New York in October for the permanent financing of that system. All the preliminary arrangements are said to have been made during conferences with New York bankers held by Mr. Lilienthal during his Eastern trip this summer. The Northern Electric Railway has \$10,000,000 of preferred stock and \$15,000,000 of common stock outstanding. There is an authorized bond issue of \$25,000,000, of which \$5,275,000 is outstanding, with \$3,784,000 reserved to retire prior liens and \$15,941,000 reserved for future corporate purposes. The company was organized in 1907 to take over the Northern Electric Railway, the Chico Street Railway, the Redding & Red Bluff Railroad, the Marysville & Yuba Street Railway and the Shasta Southern Railway. The Marysville & Colusa and the Sacramento & Woodland Railways have since been acquired and construction of a branch line from Vacaville to Suisun is nearing completion. The bonded indebtedness of the Sacramento & Woodland Railway is \$750,000.

Chicago (Ill.) Elevated Railways.—The Northwestern Elevated Railroad and the Metropolitan West Side Elevated Railway have obtained reductions in their tax assessments because the amount of cash on hand is less than last year. The Board of Review can lay an assessment against the personal property of the railroads consisting only of office furniture and cash. The company's rolling stock is assessed by the State Board of Utilization. The schedules and reviewed assessments are as follows: Northwestern Elevated Railroad, assessor's bond, \$339,092, and reviewer's bond, \$272,171; Metropolitan West Side Elevated Railway, assessor's bond, \$510,325, and reviewer's bond, \$313,869. The assessor's schedules of \$250,054 against the South Side Elevated and \$131,434 against the Chicago & Oak Park Elevated were confirmed by the reviewers.

Chicago, Ottawa & Peoria Railway, Ottawa, Ill.—Bodell & Company, Providence, R. I., are offering at 98½ and interest a small amount of Illinois Valley Railway (closed) first mortgage 5 per cent thirty-year sinking fund gold bonds of 1905, guaranteed principal and interest by indorsement by the Western Railways & Light Company. This issue has already been reduced from \$1,500,000 to \$1,304,000 by a cumulative sinking fund that should retire practically the entire issue at maturity. These bonds are

a prior lien to \$3,723,000 of Chicago, Ottawa & Peoria Railway first and refunding mortgage 5's.

Greenville, Spartanburg & Anderson Railroad, Greenville, S. C.—The directors of the Greenville, Spartanburg & Anderson Railway have voted to increase the capital stock of the company from \$5,000,000 to \$7,000,000.

Jamestown, Chautauqua & Lake Erie Railroad, Jamestown, N. Y.—A contract is reported to have been entered into for the purchase of the property of the Jamestown, Chautauqua & Lake Erie Railroad by S. B. Broadhead and A. N. Broadhead, officers of the Chautauqua Traction Company and the Jamestown (N. Y.) Street Railway. The sale price is said to be \$457,500. The sale includes all property of the Chautauqua Steamboat Company, including thirteen steamers which ply on Lake Chautauqua.

Lewiston, Augusta & Waterville Street Railway, Lewiston, Me.—On Aug. 19 the property of the Brunswick & Yarmouth Street Railway, Freeport, Me., and the Freeport Electric Light, Heat & Power Company was sold to the Lewiston, Augusta & Waterville Street Railway, which has controlled the two companies through ownership of their stock for more than a year.

Mexico, Santa Fé & Perry Traction Company, Mexico, Mo.—Operations have been suspended by the Mexico, Santa Fé & Perry Traction Company, an interurban line running from Mexico to miles north to Molino. This line was recently put in the hands of a receiver and sold at auction, as noted in the ELECTRIC RAILWAY JOURNAL of May 31, 1913. The present suspension of operations will continue until the owners, W. W. Botts and T. C. Botts, Mexico; J. W. Mundy and J. P. Cauthorn, Molino, and J. H. Botts and J. A. Botts, Santa Fé, Mo., complete the forming of a new corporation. Papers have already been filed with the Secretary of State for the formation of a corporation to be known as the Mexico Investment & Construction Company, with a capital stock of \$60,000.

Mid-Crosstown Railway, New York, N. Y.—The Mid-Crosstown Railway has petitioned the Public Service Commission for the First District of New York for permission to issue such stock and bonds as the commission may deem proper, and the Third Avenue Railway has filed a petition asking for permission to purchase and hold such stock and bonds when issued and to issue its own bonds in the sum of \$500,000 to pay for the same. A hearing on both petitions was set for Sept. 1 before Commissioner Milo R. Maltbie. The Mid-Crosstown Railway was organized to take over the property of the Twenty-eighth and Twenty-ninth Streets Crosstown Railroad, which in 1912 was sold under mortgage foreclosure and bought in by a committee of bondholders. That committee last year submitted to the commission a plan of reorganization calling for the issue by the Mid-Crosstown Railway of \$500,000 in capital stock and \$500,000 in bonds, but this was disapproved by the commission on the ground that there was no necessity for the organization of a new company to effect the contemplated sale of the foreclosed property to the Third Avenue Railway and also because the proposed security issues were in excess of the actual value of the property. Now the Mid-Crosstown Railway asks the commission to decide the proper amount of stocks and bonds to be issued.

New York (N. Y.) Railways.—The report of the New York Railways for the fiscal year ended June 30, 1913, has been made public. Compared with the previous year, six months of which were under receivers' operation, there was an increase in gross income of \$490,715. Net earnings amounted to \$4,749,010. The balance available for interest on the company's bonds was \$2,463,485. The amount paid on the income bonds for the first six months of the calendar year 1912 was 0.771 per cent. For the second six months the amount paid was 2.25 per cent, making a total of 3.02 per cent for the year. For the year ended June 30, 1913, 3.88 per cent was paid. The principal feature of this year's report is the large expenditures for improvements made and authorized during the year, approximately \$2,500,000.

New York, Westchester & Boston Railway, New York, N. Y.—The New York, New Haven & Hartford Railroad has filed with the Public Service Commission of the Second District of New York the operating income of the New York, Westchester & Boston Railway for the year ended June 30, 1913. The report shows the following items:

Gross revenue, \$289,027; total operating expenses, \$468,946; net operating deficit, \$179,914; taxes, \$105,605; operating deficit, \$285,519; non-operating revenues, \$9,536; gross deficit, \$275,983; total deductions, \$1,130,016; corporate deficit, \$1,405,999. The balance sheet as of June 30 shows cash in the amount of \$32,585 and total assets and liabilities of \$33,607,172.

Pittsburgh (Pa.) Railways.—In addition to the \$20,000,000 of 5 per cent forty-year gold bonds, which are covered by a general mortgage recently given by the Pittsburgh Railways as noted in the ELECTRIC RAILWAY JOURNAL of Aug. 23, 1913, the company has made another issue consisting of \$10,000,000 of income bonds. These have been delivered also to the Philadelphia Company, representing advances and loans made in the past to the Pittsburgh Railways. These bonds are not a part of the general mortgage issue but subordinate securities.

Dividends Declared

Brazilian Traction, Light & Power Company, Ltd., Toronto, Can., quarterly, 1½ per cent.

Chippewa Valley Railway, Light & Power Company, Eau Claire, Wis., quarterly, 1¾ per cent., preferred.

Fonda, Johnstown & Gloversville Railroad, Gloversville, N. Y., quarterly, 1½ per cent., preferred.

Galveston-Houston Electric Company, Galveston, Tex., 3 per cent., preferred, 3 per cent., common.

Manila Electric Railroad & Lighting Corporation, Manila, P. I., quarterly, 1¾ per cent.

St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., quarterly, 1¼ per cent., preferred.

Second & Third Streets Passenger Railway, Philadelphia, Pa., quarterly, \$3.

United Traction & Electric Company, Providence, R. I., quarterly, 1¼ per cent.

ELECTRIC RAILWAY MONTHLY EARNINGS

BANGOR (ME.) RAILWAY & ELECTRIC COMPANY.

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., July, '13	\$72,090	*\$31,548	\$40,542	\$17,292	\$23,250
1 " " '12	64,300	*28,833	35,467	16,558	18,909
12 " " '13	743,480	*337,535	405,945	205,601	200,344
12 " " '12	664,244	*300,193	364,051	181,082	183,000

CHATTANOOGA (TENN.) RAILWAY & LIGHT COMPANY.

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., July, '13	\$95,521	*\$57,360	\$38,161	\$24,878	\$13,283
1 " " '12	94,055	*57,519	36,536	22,246	14,290
12 " " '13	1,162,587	*694,091	468,496	283,734	184,762
12 " " '12	1,005,956	*599,396	406,560	253,874	152,686

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, MAINE

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., July, '13	\$235,247	*\$115,514	\$119,733	\$58,675	\$61,058
1 " " '12	216,795	*113,540	103,255	53,399	49,856
12 " " '13	2,232,200	*1,227,524	1,004,676	680,575	324,101
12 " " '12	2,084,840	*1,242,089	842,751	613,882	228,869

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., July, '13	\$230,716	*\$142,040	\$88,676	\$49,603	\$39,073
1 " " '12	197,978	*113,269	84,709	48,175	36,534
12 " " '13	2,597,892	*1,455,862	1,142,030	585,860	556,170
12 " " '12	2,338,573	*1,302,456	1,036,117	566,132	469,985

PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., June, '13	\$23,760	*\$15,447	\$8,314	\$7,540	\$774
1 " " '12	21,817	*13,843	7,973	7,156	817
12 " " '13	287,204	*190,440	96,763	87,953	8,810
12 " " '12	276,952	*181,398	95,554	84,452	11,102

PENSACOLA (FLA.) ELECTRIC COMPANY

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., June, '13	\$24,051	*\$15,338	\$8,712	\$6,604	\$2,108
1 " " '12	23,946	*14,007	9,939	6,377	3,562
12 " " '13	285,832	*180,583	105,250	76,752	28,498
12 " " '12	286,030	*180,204	105,827	69,636	36,191

PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., June, '13	\$683,957	*\$402,563	\$281,394	\$171,961	\$109,433
1 " " '12	660,647	*386,890	273,757	164,305	109,452
12 " " '13	8,377,565	*4,901,471	3,476,094	2,025,894	1,450,200
12 " " '12	.....	.....	.....	.....	.....

SAVANNAH (GA.) ELECTRIC COMPANY

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., June, '13	\$69,391	*\$45,772	\$23,618	\$22,577	\$1,041
1 " " '12	65,016	*48,978	16,038	16,035	3
12 " " '13	787,029	*558,880	228,149	224,549	3,600
12 " " '12	729,425	*540,362	189,063	188,028	1,035

TAMPA (FLA.) ELECTRIC COMPANY

Period	Gross Earnings	Operating Expenses	Net Earnings	Fixed Charges	Net Surplus
1m., June, '13	\$69,774	*\$41,201	\$28,572	\$4,529	\$24,043
1 " " '12	61,874	*31,891	29,984	4,365	25,619
12 " " '13	779,435	*413,389	366,046	55,141	310,905
12 " " '12	726,639	*388,443	338,196	55,606	282,590

*Includes taxes.

Traffic and Transportation

Moving Picture Instruction for Public and Employees

The safety bureau of the Chicago (Ill.) Railways, under the direction of the safety inspector, recently gave its first exhibition of "Safety First" moving picture films. Prior to advertising these public exhibitions, the park commissioners were asked permission to use space in the parks for this purpose. Owing to the fact that the exhibition was free and of an educational nature, the request was granted. Posters giving information as to where and when the exhibit would be held reading, "See the 'Safety First' pictures, free moving-picture exhibition given by safety bureau of Chicago Railways Company," were swung from the ceilings of all cars of the company. The space allotted on the posters for displaying the time and place of the various exhibitions was filled with new stickers from time to time as the locations and the dates were changed.

The first exhibition was held on the evening of Aug. 16, in one of the Lincoln Park baseball fields. A screen, 12 ft. x 15 ft. in size, stretched on a frame 20 ft. above the ground, was placed on the edge of the field. At the opposite end of the field a platform 5 ft. above the ground and approximately 90 ft. from the screen was erected to support the projecting machine. The exhibition was opened with a brief announcement by the safety inspector, who explained its object, namely, that it was to teach the people of Chicago, especially the children, how to avoid accidents. Several thousand people witnessed the exhibition.

The safety bureau of the Chicago Railways has obtained three reels and part of a fourth of these "Safety First" films. Three reels have about twenty-five scenes each, which show accidents that occur on a large street railway system. The fourth reel has sixteen scenes which depict the right and wrong way to alight from a car and the right and wrong way to cross the street. One of the reels is used exclusively to instruct employees. It contains a number of scenes which show carelessness on the part of the employees. In addition to the moving-picture films fifty instructive slides also were shown at the exhibition. In order to carry on the "safety first" campaign continuously the safety bureau of the Chicago Railways has purchased an Edison projecting machine with a metal safety booth for housing.

Record Traffic at Buffalo During Perry Celebration.—The International Railway, Buffalo, N. Y., handled the heavy traffic during the New York State Perry Victory Centennial Celebration with ease. Cars of all the East and West Side lines made through trips between the East and West Sides of the city on several nights during the celebration. Street railway traffic during the week broke all previous records.

New York Subway Flooded by Storm.—Three and thirty-eight one-hundredths inches of rain, falling at the rate of more than an inch an hour, overflowed the gutters, flooded the subway and paralyzed underground traffic in New York between 1:30 and 7:30 a. m. on Sept. 5. It was perhaps the worst tie-up in the subway's history, and the schedule was so upset that trains could not begin to handle the regular morning crowds. From the Times Square station almost to Columbus Circle the water covered local and express tracks. Before the flood had reached its height the Interborough Rapid Transit Company began pumping it out at Forty-sixth Street. A. L. Merritt, superintendent of transportation, pressed into service two flat cars equipped with electric pumps and long coils of hose to pump out the water between Forty-second and Fiftieth Streets. According to Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, the water did not cause much damage outside of short-circuiting the third-rail.

Metropolitan Service Investigation at Boston.—The Massachusetts Public Service Commission and the Boston Transit Commission, sitting as a joint board by order of the last Legislature, opened a series of hearings at Boston on Sept. 4 upon street railway service conditions in the Boston metropolitan district. Chairman McLeod of the former board presided. The principal matter discussed

was the proposed establishment of service at a 6-cent fare between Boston and Revere Beach by the Boston Elevated Railway. The plan would necessitate operating the company's cars over 1½ miles of track between Orient Heights and Revere Beach now controlled by the Bay State Street Railway. At present an 8-cent fare is in effect between Boston and Revere Beach via Chelsea. The proposed service would utilize the East Boston tunnel and would provide quick connections between terminals. By the terms of the resolve the board is authorized to spend not more than \$5,000 upon the investigation of transit conditions within the metropolitan park district.

Plan to Prevent People Crossing Street in Middle of Block.—A law to prohibit persons crossing streets except at intersections and the establishment of a public safety committee are suggested by Coroner Hoffman, of Chicago, to stop the increase in automobile, street car and vehicle accidents in that city. The coroner is having compiled figures to show the number of accidents which occur away from the street intersections. He is quoted as follows: "I am sure from my investigation so far that more persons are killed trying to cross the streets in the middle of the block than at the intersections. I am going to have the exact figures in a few days, and then I will take up the matter with the city authorities and see if an ordinance cannot be passed making it a misdemeanor for a person to cross the street except at a street intersection. I think the City Council has authority to pass such a law, and I believe our courts would uphold it. A law of that kind would expedite traffic, because the drivers of automobiles and vehicles and the motormen would not have to be constantly on the lookout for persons dodging out into the street in the middle of the block."

Illinois Traction System Abandons Registry System on Interurban Lines.—The Illinois Traction System has abandoned the registry system of collecting fares on interurban trains and adopted the cash fare duplex and the ticket collection system in use on steam railroad passenger trains. The percentage of cash fares collected is quite small when compared with the total daily collections of each conductor, consequently there has been little or no delay since the new system of collecting fares was adopted. The cash fare duplex which is used is manufactured and sold by the McDonald Cash Fare & Ticket Company, Cleveland, Ohio. It consists of a small metal box or holder containing approximately 100 cash fare duplexes. When a conductor receives a cash fare the amount is shown on the duplex by setting the pointers on the closed portion of the box and the duplex is torn in two. One portion is given to the passenger and the stub falls back into the inclosed box or holder, which is turned in to the terminal ticket agent. The stubs are forwarded to the auditor, and the holder is refilled with another pad and locked by the agent, who is the only person authorized to open it. These holders are approximately 6 in. long by 1½ in. wide and can be carried conveniently in the pocket.

Cincinnati Interurban Line Operated at Loss.—The Interurban Railway & Terminal Company, Cincinnati, Ohio, is operated at an annual loss of \$40,000, according to a statement made by Attorney Frank Dinsmore, representing that corporation, at a conference called by Acting Service Director Michael J. Keefe, of Cincinnati, on Aug. 26, 1913, to take up the matter of improved railway facilities to Pleasant Ridge. Among those present at the gathering were Mayor Hunt, City Solicitor Bettman, Attorney Dinsmore, General Superintendent F. H. Talbot of the Interurban Railway & Terminal Company, Assistant General Manager Fitzgerald of the Cincinnati Traction Company, and J. C. Marshall and A. C. Mundew of the Pleasant Ridge Welfare Association. It was in answer to a complaint of poor service that Attorney Dinsmore made the reference to the annual loss of the company. He further said that the company was anxious to sell its tracks from Harris Avenue, in Norwood, to the north limits of Kennedy Heights, and that he, representing George Worthington, Cleveland, principal owner of the company, would immediately take up the matter with President Schoepf, of the Cincinnati Traction Company. If the sale is made, the interurban company will lease trackage from the city company within the city limits and will not handle local passengers.

Personal Mention

Mr. J. J. Lewis has been appointed auditor of the Evans-ton (Ill.) Traction Company.

Mr. W. H. Given has been appointed assistant general manager of the Waterloo, Cedar Falls & Northern Rail-way, with office at Waterloo, Ia.

Mr. W. A. Cattell, consulting engineer of San Francisco, Cal., has been appointed consulting engineer of the San Francisco-Oakland Terminal Railways.

Mr. T. W. Ralph, associated with the Canadian Northern Railway, has been appointed auditor of the Chatham, Wal-laceburg & Lake Erie Railway, Chatham, Ont.

Mr. T. J. Day has been appointed assistant to the traffic manager of the Pacific Electric Railway, with headquarters in the Pacific Electric Building, Los Angeles, Cal.

Mr. H. R. Parker has been appointed special agent of the Waterloo, Cedar Falls & Northern Railway, with office at Waterloo, Ia., vice Mr. Maurice A. Welsh, promoted.

Mr. Maurice A. Welsh has been appointed chief special agent of the Waterloo, Cedar Falls & Northern Railway, with office at Waterloo, Ia. His jurisdiction will extend to the claim and special agent's departments.

Mr. L. E. Pritchett has been transferred from the Handley shops of the Northern Texas Traction Company, Fort Worth, Tex., to assume the duties of master mechanic for the Beaumont (Tex.) Traction Company.

Mr. E. P. Doyle, who for the past eight years has been master mechanic of the Aurora, Elgin & Chicago Railroad, Wheaton, Ill., has resigned to take charge of the shops of the Peter Smith Heater Company, Detroit, Mich.

Mr. O. A. Voepel has resigned as master mechanic of the St. Francois County Railroad, Farmington, Mo., to become connected in a similar capacity with a new road under construction between Kansas City and Bonner Springs.

Mr. Harry O'Brien has been appointed superintendent of overhead of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., to succeed Mr. J. J. Brennan, who formerly had charge of the department in addition to the roadway.

Mr. B. T. Longino, superintendent of transportation of the Tacoma Railway & Power Company, Tacoma, Wash., for the past three years, is leaving the Stone & Webster organization to engage in the machinery and supply business in Tacoma.

Mr. Gaston de Pellerin de la Touche, engineer and director of the North and South Underground Railway, Paris, France, is in the United States as a member of the French commission which is to arrange for France to be represented at the Panama-Pacific Exposition.

Mr. H. D. Norford has been appointed superintendent of maintenance of way of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., to succeed Mr. J. J. Brennan, who has been appointed superintendent of transportation of the company, as mentioned elsewhere in this column.

Mr. T. F. Marsh, of the transportation department of the Seattle (Wash.) Electric Company, has been appointed superintendent of transportation of the Tacoma Railway & Power Company, Tacoma, Wash., to succeed Mr. B. T. Longino, whose resignation from the company is referred to elsewhere in this column.

Mr. F. C. Chambers, formerly general superintendent and purchasing agent of the County Traction Company, Chi-cago, Ill., has been appointed superintendent of power of the Des Moines (Ia.) City Railway and the Interurban Rail-way, Des Moines, vice Mr. R. A. Foresman, who resigned to accept a position with the Eastern Pennsylvania Power Company, Easton, Pa.

Mr. William B. McKinley, president of the Illinois Traction System, Peoria, Ill., had a farewell dinner tendered him at the Country Club at Peoria recently by Mr. Frederick H. Smith and Mr. H. E. Chubbuck, vice-president executive of the Illinois Traction System. Mr. Smith acted as toastmaster. Mr. E. F. Baldwin, Mr. Chubbuck and Mr.

McKinley were the prominent speakers. Mr. McKinley expects within a few days to sail from Seattle for Japan on a tour of the world originally planned two years ago.

Mr. L. A. Gilbert, formerly superintendent of transportation of the County Traction Company, Chicago, Ill., has been appointed superintendent of operation of the Evans-ton (Ill.) Traction Company. He has been connected with the North Chicago Street Railroad and the Chicago Con-solidated Traction Company for the past twenty-two years. At the time these companies were consolidated as the Chi-cago Railways he was made superintendent of transporta-tion of the County Traction Company, which was recently reorganized.

Mr. J. F. Collins, vice-president and general manager of the Michigan United Traction Company, Jackson, Mich., who was hurt in the automobile accident near Detroit on the evening of Aug. 9, 1913, is progressing toward recovery, and it is expected that he will be back in Jackson about the first week in October. At present he is at St. Vin-cent's Hospital, Toledo. In order to set Mr. Collins' limb properly it was necessary to operate. This operation was performed on Aug. 20 and his condition has steadily im-proved since that time.

Mr. E. E. Eckert has been appointed contracting freight agent by the Akron, Canton & Youngstown Railway, with offices at Akron, Ohio. Mr. Eckert was at Coshocton for fourteen years as freight and passenger agent for the Wheel-ing & Lake Erie Railroad. The position to which Mr. Eck-ert has been appointed is a new one, and an officer of the company is quoted as follows: "Akron will be our main point, and it will constitute a big shipping point for us. We are organizing a complete railroad headquarters force as rapidly as conditions will allow, and look forward to a large amount of business."

Mr. J. J. Brennan, formerly superintendent of roadway and overhead of the Fort Wayne & Northern Indiana Trac-tion Company, Fort Wayne, Ind., has been made superin-tendent of transportation to succeed Mr. C. E. Palmer, whose resignation was mentioned in the *ELECTRIC RAILWAY JOURNAL* of Aug. 9, 1913. Prior to Mr. Brennan's becoming connected with this company he was with the Merchants' Heat & Light Company, Indianapolis, Ind. In 1904 he was made foreman of overhead and construction of the Fort Wayne & Northern Indiana Traction Company, and con-tinued in that position until Aug. 1, this year, when he was appointed superintendent of transportation.

Mr. J. W. Hancock, general manager of the Roanoke Railway & Electric Company, Roanoke, Va., has had his jurisdiction extended to include the property of the Lynch-burg Traction & Light Company, Lynchburg, Va., as stated in the *ELECTRIC RAILWAY JOURNAL* of Sept. 6, 1913. Mr. Han-cock retains his connection with the Roanoke Railway & Electric Company and will manage both properties, divid-ing his time between them. Mr. Hancock was born in Franklin County, Virginia, and has lived in Roanoke since 1890. He entered the service of the Roanoke Street Rail-way in April, 1895, and was appointed general manager when the company was reorganized early in 1900. He is president of the Public Service Association of Virginia, the Mill Mountain Incline, Inc., Roanoke, and the Little Tun-nel Water Power Company, a vice-president of the Roa-noke Chamber of Commerce, a member of the American Institute of Electrical Engineers and the Shenandoah Club, Roanoke, and a director of the Roanoke Fair Association. The system in Roanoke includes 30 miles of track and forty cars; that in Lynchburg 14 miles of track and forty cars.

OBITUARY

Charles A. Sterling, who was a vice-president of the Pub-lic Service Corporation of New Jersey, Newark, N. J., from 1903 until the time of his retirement from active business five years ago, is dead. Mr. Sterling was president of the National Storage Company, a subsidiary of the Standard Oil Company, for thirty years. He became connected with the Public Service Corporation following the absorption of the Orange & Passaic Valley Electric Railway by that com-pany. He had been for some time previous president of the Orange & Passaic Valley Electric Railway. Mr. Ster-ling was also interested in the Jersey City, Hoboken & Paterson Street Railway. He was seventy years old.

Construction News

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

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

RECENT INCORPORATIONS

***Mexico Investment & Construction Company, Mexico, Mo.**—Application for a charter has been made by this company in Missouri to take over the Mexico, Santa Fé & Perry Railway, which was incorporated to build an electric line to connect Boone, Callaway, Audrain, Monroe, and Ralls Counties, a distance of 13 miles. Capital stock, \$60,000. Incorporators: W. W. Botts and T. C. Botts, Mexico; J. W. Mundy and J. P. Cauthorn, Molino, Mo.; J. D. Botts and J. A. Botts, Santa Fé, Mo.

***Farrell (Pa.) Railways.**—Application for a charter will be made by this company in Pennsylvania to build an electric railway on Haywood Street and Indiana Avenue in Farrell to Sharon, forming a loop and returning to Haywood Street in Farrell.

FRANCHISES

Santa Ana, Cal.—The Pacific Electric Railway has received a franchise from the Council to extend its tracks east on Fourth Street to the city limits of Santa Ana.

Macon, Ga.—The Macon Railway & Light Company has received a franchise from the Council to double-track Spring Street from Ocmulgee Street to Spring Street bridge in Macon.

Peoria, Ill.—The Peoria, Canton & Galesburg Railway has received a forty-year franchise from the Council in Peoria. This 52-mile line will connect Peoria, Canton and Galesburg. Horace Clark, president. [E. R. J., June 28, '13.]

Rockford, Ill.—The Rockford City Traction Company has asked the Council for a new twenty-year franchise in Rockford.

Portland, Maine.—The Portland Railroad has asked the Council for a franchise to lay tracks in Portland to accommodate the Portland, Gray & Lewiston Railway, which will soon operate in Portland.

Detroit, Mich.—The Detroit United Railway has received a franchise from the Council for a north and south cross-town line on the West Side and extensions on Kercheval Avenue in Detroit.

New York, N. Y.—The New York, Westchester & Boston Railway has applied to the Public Service Commission, First District, for permission to abandon its franchise on lines extending to Clason Point and Throg's Neck, in the Bronx.

Toronto, Ont.—The Forest Hill Electric Railway, Toronto, has received a franchise over Eglinton Avenue, Forest Hill Road, Bathurst Street and Dufferin Street in Toronto.

***Farrell, Pa.**—The Farrell Railways will ask the Council for a franchise to build a line in Haywood Street and Indiana Avenue to Sharon, forming a loop, returning to Haywood Street in Farrell.

Sharon, Pa.—The Sharon-Farrell Railways has asked the Council for a franchise in Sharon. This is part of a plan to build an electric line between Sharon and Farrell. [E. R. J., Aug. 16, 1913.]

Sharon, Pa.—The Youngstown & Sharon Railway & Light Company has asked the Council for a franchise to build extensions in the east and west districts of Sharon.

San Antonio, Tex.—The San Antonio Traction Company will ask the Council for a franchise on that portion of West Commerce Street between Alamo Plaza and Military Plaza.

Denton, Tex.—E. P. Turner, representing the Dallas Northwestern Traction Company, has received a franchise from the Council in Denton. This is part of a plan to build a line between Denton, Dallas and Krum. [E. R. J., July 26, '13.]

TRACK AND ROADWAY.

British Columbia Electric Railway, Vancouver, B. C.—The laying of a second track on the line along the Westminster Road in South Vancouver has been completed by this company. An extension of the line in the Queensboro section of New Westminster is to be built at once along

Canal Street to a junction with the Canadian Northern Pacific Railway tracks at Ewen Avenue.

Vancouver Island Hydroelectric & Tramway Company, Victoria, B. C.—This company plans to construct an electric railway between Ladysmith and Nanoose Bay, B. C., with extensions. The two points named are 50 miles apart, and it is said that the necessary surveys have been made and that the Minister of Railways for the Province has approved the route. M. Yates, Victoria, B. C., is the principal promoter.

Fresno, Hanford & Summit Lake Railroad, Fresno, Cal.—Plans are being considered by this company for a 2-mile extension from its main line in Fresno to Calwa.

Fresno (Cal.) Traction Company.—This company has been asked to extend the Tulare Street line in Fresno into Arlington Heights.

Pacific Electric Railway, Los Angeles, Cal.—Work has been begun by this company laying rails on Rialto Avenue west from F Street in San Bernardino. Grading has been begun on the Magnolia extension in Arlington. The company plans to build an extension from the present terminus on East Fourth Street east on East Fourth Street to the city limits of Santa Ana.

Big Four Electric Railway, Tulare, Cal.—About 21 miles of grading has been completed by this company, and it is about to lay ties and rails, which have been purchased. The line will soon be completed from Tulare to Visalia and Woodville. The last stretch of grading is now being completed toward Porterville, and the company plans to have this section of its line in operation about the first of the year. [E. R. J., Sept. 6, '13.]

Bristol & Plainville Tramway, Bristol, Conn.—An order has been placed by this company for new 90-lb rails to be laid from the end of the line at Maple Street to a point easterly on East Street, 1½ miles.

New Britain, Kensington & Meriden Tramway Company, New Britain, Conn.—This company, which plans to build an electric railway from the end of the Arch Street line in New Britain through to Meriden, and a line to extend from Upson's Corner past the American Paper Goods Company's factory and on through Meriden, organized recently by electing the following officers: E. Allen Moore, president; Charles F. Lewis, treasurer, and Frank F. Hanford, secretary. Several years ago a charter was granted this company which provided that it could build if an earlier charter granted to C. J. Danaher, Meriden, was not used.

Shore Line Electric Railway, Norwich, Conn.—The extension of this company's line from Saybrook to New London has been placed in operation.

Carolina & Georgia Railway, Augusta, Ga.—It has been decided that this railway, which will be built between Augusta and Columbia, a distance of 75 miles, shall, after leaving Graniteville in Aiken County, go by way of Trenton and Johnston, instead of via Eureka, and that Johnston shall be a junction point, the main line going on to Augusta and the branch leading out from Johnston going to Greenwood. James U. Jackson, Augusta, president. [E. R. J., May 3, '13.]

Southern Illinois Railway & Power Company, Chicago, Ill.—This company has placed in operation its new line between Harrisburg and Eldorado. It will eventually be extended to Carrier Mills, 8 miles south. A survey is being made between Harrisburg and Marion.

Southern Traction Company of Illinois, East St. Louis, Ill.—This company, which has a franchise over the St. Louis Municipal Bridge, has begun to lay its tracks from the city limits of East St. Louis on Tudor Avenue to Twenty-first Street in East St. Louis. The work is being done by the Lorimer-Gallagher Construction Company. This is part of the plan to build a line between East St. Louis and Belleville.

Evanston (Ill.) Traction Company.—This company, the incorporation of which was noted in the ELECTRIC RAILWAY JOURNAL of Aug. 9, 1913, has purchased the portion of the County Traction Company's lines in the city of Evanston. The officers of the new company are: Clement C. Smith, Milwaukee, Wis., president and general manager; R. E. Belknap, vice-president; George Allison, secretary and treasurer; L. A. Gilbert, superintendent; Michael Kreds, super-

intendent of construction and supervising engineer, and J. Moore, supervising engineer for the city of Evanston.

Hillsboro Electric Light & Power Company, Hillsboro, Ill.—This company has agreed to double-track the Hillsboro Street bridge, and the line will be so changed that both of these tracks will be straight.

Galesburg & Kewanee Electric Railway, Kewanee, Ill.—This company plans to extend its line to Galesburg in the near future.

Chicago, Peoria & Quincy Traction Company, Quincy, Ill.—Funds are being raised by this company in Quincy and Lewiston for the construction of its line between Quincy and Peoria. E. A. Van Ness, secretary. [E. R. J., Aug. 30, '13.]

Fort Wayne & Northwestern Railroad, Fort Wayne, Ind.—A large sum is being spent by this company on improvements. It is changing from alternating to direct current and plans are being considered to build a 30-mile extension to Goshen. It is stated that Rome City will ask the company to build a branch from Kendallville to Rome City, and if the company does not look favorably upon the plan the Commercial Club will build the branch and later endeavor to sell it to the company.

Richmond & Eastern Indiana Traction Company, Richmond, Ind.—Interest has been revived in the plans for the construction of this line, which will extend from the northern to the southern boundary of the State of Indiana. The section between Richmond and Portland will be built first. The Richmond Commercial Club is interested. [E. R. J., March 16, '12.]

Cedar Rapids & Marion City Railway, Cedar Rapids, Ia.—Work has been begun by this company laying ties and rails on its Grand Avenue line, and track work will soon be begun on the new Third Avenue bridge in Cedar Rapids.

Davenport-Muscataine Railway, Davenport, Ia.—The Mulberry Avenue line in Muscatine will be extended to Wier Street and the Geneva Golf and Country Club by this company in the near future.

Waterloo, Cedar Falls & Northern Railway, Waterloo, Ia.—Construction has been begun by this company on a new line in Waterloo. Considerable double-tracking is being done.

Kentucky Traction & Terminal Company, Lexington, Ky.—Owing to the fact that in conjunction with the city of Lexington, Ky., and the Louisville & Nashville Railroad it is arranging for the construction of a viaduct on West Main Street, the Kentucky Traction & Terminal Company, operating in Lexington, is re-routing the car lines which have used Main Street heretofore.

Madisonville, Ky.—M. K. Gordon, James R. Rash and others interested in the construction of an electric line from Madisonville to Nortonville, Ky., a distance of 12 miles, have engaged Clarence Nisbet as engineer and a survey is now being made. The Hopkins County Commercial Club, Madisonville, is also interested in the project. [E. R. J., March 22, '13.]

Boston, Mass.—Bids will be received by the Boston Transit Commissioners (B. Leighton Beal, secretary) until Sept. 23, for building Section J of the East Boston tunnel extension in Cambridge Street, from Staniford Street to North Russell Street, about 580 lin. ft.

Seymour, Mo.—W. K. Loba, Chicago, says that the electric railway which he and his associates are promoting will probably extend from Seymour, 28 miles south of Springfield, to Cotter, 80 miles distant. Bonuses to the amount of more than \$250,000 are said to have been pledged by the towns through which the line will run. The company which will be organized to build the line will be capitalized at \$3,000,000.

Missoula (Mont.) Street Railway.—Work has been begun by this company on the extension north from the Northern Pacific viaduct in Missoula.

St. John (N. B.) Suburban Railway.—Surveys have been made by this company for a line from St. John to Loch Lomond, 14 miles, and for a portion of the line from St. John to Rothesay. It is proposed in addition to build a line from St. John to Westfield and Milledgeville, N. B.

Brooklyn (N. Y.) Rapid Transit Company.—This company is asked to consider plans to extend its Metropolitan Avenue line from the Lutheran Cemetery to Jamaica.

International Railway, Buffalo, N. Y.—Track improvements costing upward of \$750,000 are being made in various parts of Buffalo by this company. Among the improvements will be the relaying of new steel rails in Military Road from the Buffalo city line to the New York Central & Hudson River Railroad crossing.

Interborough Rapid Transit Company, New York, N. Y.—Chairman McCall of the Public Service Commission has asked this company if it will accept, under the present existing contract, an additional extension to the Long Island Rapid Transit system. The contract of the Interborough company requires it to construct the rapid transit system as far as Corona, L. I.

New York, N. Y.—Bids will be received by the Public Service Commissioners for the First District, 154 Nassau Street, New York, until Oct. 1, for constructing Section 2 of Routes 4 and 38, Seventh Avenue-Lexington Avenue, Rapid Transit Railroad. This is a four-track subsurface railroad under Greenwich Street, West Broadway and Varick Street, Manhattan, between a point in Greenwich Street about 70 ft. south of Vesey Street and a point in Varick Street about 100 ft. south of Beach Street.

Dayton, Middletown & Cincinnati Railway, Middletown, Ohio.—Plans are being considered by this company to build an electric line from Dayton to Cincinnati, via Middletown. Headquarters, Middletown. E. H. McKnight, general manager.

Poland Street Railway, Youngstown, Ohio.—Grading has been completed and the laying of rails will be begun at once by this company on its line between Poland and Youngstown. George E. Rose is interested. [E. R. J., May 3, '13.]

***Oklahoma, Okla.**—It is reported that plans are being considered by capitalists of Tulsa, Okla., and Bartlesville and Coffeyville, Kan., to establish a through electric line from Kansas City, Mo., south to Tulsa, about 275 miles. The plans include the consolidation of existing railways in Coffeyville, Independence, Cherryvale, Iola, Ottawa and Olathe, in Kansas, and in Bartlesville, Dewey and Tulsa in Oklahoma. The Kansas City-Olathe line, the Coffeyville-Cherryvale line and the short line from Bartlesville to Dewey are to form links in the proposed railway. Harry F. Sinclair, Tulsa, is in charge of the financial arrangements.

Rapid Transit Interurban Company, Tecumseh, Okla.—Surveys have been completed by this company between Tecumseh and Sulphur, a distance of 58 miles. The line will connect Shawnee, Tecumseh, Asher, Chism, Stratford and Sulphur. J. J. Cissna, Tecumseh, secretary. [E. R. J., Feb. 1, '13.]

Morrisburg & Ottawa Electric Railway, Ottawa, Ont.—The contract for the construction of 12 miles of this company's line between Ottawa and Greely has been awarded to R. J. Tierney & Company, Ottawa. This 47-mile line will connect Ottawa and Morrisburg, via Leitrim, South Gloucester, Ormond, Winchester, Greely, Metcalfe, Williamsburg and Glen Becker. J. G. Kilt, Citizens' Building, Ottawa, president. [E. R. J., May 24, '13.]

Portland Railway, Light & Power Company, Portland, Ore.—This company is asked to consider plans to build an extension to Sandy, connecting either with the Estacada line at Boring or with the Mount Hood Railway at Cottrell. The distance from either place would be the same, 7 miles.

Shippensburg, Newburg & Western Railway, Shippensburg, Pa.—Work has been begun by this company on its 16-mile line to connect Shippensburg, Newburg, Cold Spring, Roxbury and McConnellsburg. The company was recently organized and the following officers elected: J. C. McGraw, president; B. Frank Patterson, vice-president and general manager; Paul Noftsker, secretary; George B. Watson, Newburg, treasurer, and T. L. Essick, chief engineer. [E. R. J., Aug. 30, '13.]

Middle Tennessee Traction Company, Franklin, Tenn.—It is stated that part of the grades and stone abutments have been constructed by this company on its 70-mile line between Franklin, Eagleville, Shelbyville and Fayetteville. P. E. Cox, general manager. [E. R. J., Aug. 16, '13.] building new turn-outs in Manchester.

Jefferson County Traction Company, Beaumont, Tex.—This company has completed its line between Beaumont and Port Arthur. [E. R. J., Aug. 30, '13.]

Marshall (Tex.) Traction Company.—An extension to Turney Park in Marshall will be built by this company.

Southwestern Traction Company, Temple, Tex.—Surveys have been completed by this company on its line between Temple and Waco and from Temple to Austin.

Ohio Valley Electric Railway, Huntington, W. Va.—The city commissioners of Huntington, W. Va., have insisted on the paving between the tracks of this company's line in Huntington being laid on a concrete base. The company desired to lay it on a stone base.

Wisconsin Electric Railway, Oshkosh, Wis.—Right-of-way is being secured by this company between Oshkosh and Neenah, via Lake Shore Road and Winnchago.

SHOPS AND BUILDINGS

Edmonton (Alta.) Interurban Railway.—Plans are being made by this company to build new carhouses on Algonquin Avenue in Edmonton. One structure will be one-story, 34 ft. x 64 ft., and of frame construction, and the other will be 200 ft. x 100 ft., one-story, and of brick and frame construction.

East St. Louis, Columbus & Waterloo Railway, East St. Louis, Ill.—Plans are being made by this company to build a new freight depot in East St. Louis.

Nipissing Central Railway, Cobalt, Ont.—This company has awarded a contract to the Sutcliffe & Needlands Company, Liskeard, to build its new carhouses at North Cobalt.

Portland Railway, Light & Power Company, Portland, Ore.—This company has been asked to consider plans to build a new interurban terminal station on the east side of the Willamette River at East Water Street and East Morrison Street in Portland.

Southern Traction Company, Dallas, Tex.—Work will be begun at once by this company on its new freight station in Dallas. The structure will be one-story, 100 ft. x 200 ft., and of brick construction. In addition there will be several baggage sheds.

POWER HOUSES AND SUBSTATIONS

Fort Wayne & Northwestern Railroad, Fort Wayne, Ind.—A new power house and substations are being built by this company in Fort Wayne. The cost is estimated to be about \$200,000.

Detroit (Mich.) United Railway.—This company is installing a 10,000-hp steam turbine at Station B, at Riopelle Street and Atwater Street, to add to the power capacity of its plants in use in Detroit.

City Light & Traction Company of Sedalia, Sedalia, Mo.—Work has been begun by this company on an addition to the Broadway power house in Sedalia, which will contain a new 400-hp boiler.

International Railway, Buffalo, N. Y.—Plans are under way for the construction of an addition to this company's Fillmore Avenue power station in Buffalo. A 1000-kw rotary converter will be installed in the addition.

Columbus Railway & Light Company, Columbus, Ohio.—This company will add to its substation equipment a 200-kw motor-generator set. The order has been placed with the General Electric Company.

Portland, Eugene & Eastern Railway, Portland, Ore.—The Oregon Power Company, a subsidiary of the Northern Idaho & Montana Power Company, has closed contracts with the Portland, Eugene & Eastern Railway to furnish all the power for the lines of that company between Eugene and Salem. The power will be supplied from the Springfield plant, and a 33,000-volt line will be run to Albany.

Nashville Railway & Light Company, Nashville, Tenn.—An order has been placed by this company with the General Electric Company for three 6500-kw Curtis turbo-generators with switchboard and accessories.

Charleston-Dunbar Traction Company, Charleston, W. Va.—This company will add to its substation equipment a 200-kw rotary converter, two 100-kva transformers and switchboard recently purchased from the General Electric Company.

Manufactures and Supplies

ROLLING STOCK

Kansas City, Lawrence & Topeka Railway, Kansas City, Mo., is in the market for some new cars for a recent extension of its lines.

Manhattan & Queens Traction Corporation, New York, N. Y., expects to purchase one snow plow. It has ordered one sweeper from the Smith-Wallace Company.

Trenton, Bristol & Philadelphia Street Railway, Philadelphia, Pa., is reported to have purchased two second-hand cars from the Philadelphia Rapid Transit Company.

Evanston (Ill.) Traction Company, the successor to the County Traction Company, is preparing plans and specifications for ten double-truck, double-end, pay-as-you-enter cars of the latest design.

Southern Pacific Company, San Francisco, Cal., noted in the ELECTRIC RAILWAY JOURNAL of Aug. 30, 1913, as being in the market for sixteen cars, expects to use these cars on its subsidiary, the Portland, Eugene & Eastern Railway.

Chicago (Ill.) City Railway is preparing plans and specifications for new cars. It is contemplated that this order will include at least twenty-five cars and the plans and specifications will be ready for manufacturers about Sept. 20.

Chicago (Ill.) Elevated Railways is equipping twenty standard trail cars with motors, control and air-brake apparatus. The equipment for each car will include two Westinghouse 302-B2 interpole field control motors. These will be used in connection with Westinghouse multiple unit control and complete universal air-brake equipment.

Montreal (Que.) Tramways, reported in the ELECTRIC RAILWAY JOURNAL of Aug. 6 as having ordered twenty-five motor cars from The J. G. Brill Company, has specified the following details for this equipment:

Seating capacity.....	48	Couplers	Tomlinson
Bolster centers, length..	21 ft.	Curtain fixtures,	National L. W. Co.
Length of body..	32 ft. 3 in.	Curtain material...	Pantasote
Length over vestibule,	44 ft. 3 in.	Destination signs...	Keystone
Width over sills.	8 ft. 3 in.	Gears and pinions,	Westinghouse
Width over all...	8 ft. 4 3/4 in.	Gongs	Dedenda
Height, rail to sills,	2 ft. 3 13/16 in.	Hand brakes....	Brill ratchet
Sill to trolley base,	8 ft. 10 7/8 in.	Motors...Westinghouse	337-C
Body..	wood, steel sheathing	Motors	inside-hung
Interior trim.....	cherry	Paint	Murphy
Headlining	Agasote	Sanders	Dumpit
Roof.....	plain arch	Sash fixtures,	National L. W. Co.
Underframe	steel	Seats	Winner
Bumpers.	Brill; Hedley anti-climbers	Seating material....	rattan
Cables	Westinghouse	Step treads.....	Mason
Car trimmings.....	Brill	Trolley retrievers....	Wilson
Conduits and junction	boxes	Trucks.....	Brill No. 27-GE
Control	Westinghouse	Varnish	Murphy
		Ventilators	Garland
		Control	Westinghouse

TRADE NOTES

D. C. & Wm. B. Jackson, Boston, Mass., engineers, have appointed Edward L. Moreland manager of their Boston office.

Atlas Preservative Company, New York, N. Y., has received an order for its Atlas A weed killer from the United Railways of Havana.

Hale & Kilburn, Philadelphia, Pa., at a meeting of directors on Sept. 11, passed the dividend on the common stock. The last disbursement on the issue was 1 per cent on June 30.

Alexander Brown & Sons, Baltimore, Md., have published for the use of their clients a very complete thirty-eight page pamphlet describing the property and securities of the United Railways & Electric Company, Baltimore.

C. N. Repogle, Johnstown, Pa., has resigned as assistant superintendent of the steel car department of the Cambria Steel Company in order to accept the position of general manager for the Ralston Car Company, Columbus, Ohio.

Warner International & Overseas Engineering Company, Ltd., London, England, has received the fourth order from Colombo for its non-parallel M. G. trucks. The wheel-base is 9 ft.; length over body, 18 ft. 8 in.; length over all, 28 ft.; gage, 3 ft. 6 in.

Curtain Supply Company, Chicago, Ill., has received an order to equip the twenty new cars which are being built by the Cincinnati Car Company for the Virginia Railway & Power Company with curtains using ring No. 89 fixtures and Rex all-metal rollers.

Esterline Company, Indianapolis, Ind., has moved from Lafayette, Ind., to Indianapolis in order to secure increased manufacturing facilities for producing its lighting systems for street railways, locomotives, etc. The company has appointed W. McK. White its sales manager.

Edward F. Wickwire, sales manager of the Ohio Brass Company, Mansfield, Ohio, who was injured in an automobile accident near Detroit, Mich., on Aug. 9, is convalescing at his home in Mansfield and expects to be able to return to work by the latter part of this month.

Pittsburgh High-Voltage Insulator Company, Derry, Pa., has issued Catalog No. 3, illustrating and listing its high potential, clay body, mahogany glaze porcelain insulators and special pieces for electrical requirements, and describing its testing department for making potential, design and mechanical tests.

Pittsburgh Crucible Steel Company, Midland, Pa., has decided on an underground system of electrical distribution in the new steel plant it is constructing. The company will use for this installation 100,000 ft. of J-M fiber conduit, a product of the H. W. Johns-Manville Company, which is made from a specially treated fiber or wood pulp molded under hydraulic pressure.

Westinghouse Lamp Company, Bloomfield, N. J., has appointed H. S. Black manager of works, to succeed R. H. Henderson, resigned. Mr. Black has had considerable experience in the engineering and manufacturing departments of the National Quality Lamp Division of the General Electric Company and for the last three years has been directing the work of the St. Louis factory of this company.

A. L. Havens, for the last five years manager of the Los Angeles office of Pierson, Roeding & Company, San Francisco, Cal., has resigned and R. H. Husbands has been appointed his successor. Mr. Havens finds it necessary to devote his entire time to his private interests in the Southwest. Mr. Husbands, who assumes the position as manager, was for six years manager of Pierson, Roeding & Company's Seattle office.

Guy E. Tripp, chairman of the board of directors of the Westinghouse Electric & Manufacturing Company, sailed on Sept. 11 on the Cedric from Liverpool, and will arrive in New York about Sept. 18. Mr. Tripp has spent above five weeks in Europe, looking over the condition of the foreign subsidiaries of the Westinghouse company. The directors of the Westinghouse Electric & Manufacturing Company will meet the latter part of this month for dividend action.

Ohio Brass Company, Mansfield, Ohio, is now manufacturing all-wire rail bonds with pin-driven terminals. All types of bonds which this company has been furnishing with compressed terminals are now furnished in addition with the pin-driven terminals. The new bonds have embodied in them the same features which have characterized the older types, namely, terminals and body, made of the same strands and the strands protected by thin copper sleeves at the point where they are welded together to form the terminals.

Graphite Lubricating Company, Bound Brook, N. J., has erected a two-story stucco-finish office building on the John and Main Streets corner of its property. The office force moved into the new building last week. The former office building on the Church Street side of the company's plant has been remodeled for manufacturing purposes, and a complete line of new machinery has been installed in it in order to meet the growing demand for the company's sole product—oilless bearings. A twelve-station Western Electric interphone system has been put in, and other extensive improvements to the equipment made throughout the entire plant.

Pyrene Manufacturing Company, New York, N. Y., has made arrangements for the Western Electric Company to act as a distributor of its various products, including Pyrene fire extinguishers, liquid and brackets, through the latter's twenty-five branches in this country. The Pyrene Manufacturing Company has received new orders from the Schenectady Railway and the Milford & Uxbridge Street Railway and repeat orders from the International Railway, the Interborough Rapid Transit Company, the Hudson & Manhattan Railroad, the Syracuse, Lake Shore & Northern Railroad, the Northwestern Pennsylvania Railways, the Rochester Railway, the Tonawanda Power Company and the Consolidated Car Heating Company.

Titanium Alloy Manufacturing Company, Niagara Falls, N. Y., has issued Rail Report Bulletin No. 2, giving results of chemical and physical tests and microscopic views of plain and titanium-treated open-hearth rails. The report contains measurements made by R. W. Hunt & Company of the wear of both kinds of open-hearth rails on a curve with 100-ft. radius on the Boston Elevated Railway, where the headway is frequently less than one minute. In 214 days the average wear of the plain rail was 0.755 cu. in. and of the titanium-treated rail only 0.537 cu. in. Records are given also of tests for wear and strength, made by testing machines. To one interested in photo-micrographs the photographs taken from different parts of different types of rail will prove most interesting.

Union Switch & Signal Company, Swissvale, Pa., has fitted up in its power house an exhibition room in which the operation of the various devices made by the company can be demonstrated for the benefit of visitors. A miniature railway track is laid out which is divided into sections by insulated joints. Full-size signals of various types are stationed at intervals and connected up with automatic train stops. A miniature locomotive is made to draw a train over the track in perfect obedience to the signals. As the train proceeds it shunts the various track circuits as it passes over them, thereby setting the signals and operating the electric locking on the levers of the machines, as well as causing the lever light, annunciators, block indicators, etc., to display the proper indications in the same manner as would be the case on a railway in actual service operation.

ADVERTISING LITERATURE

Murphy Iron Works, Detroit, Mich., have issued two catalogs describing and illustrating their automatic smokeless furnaces.

Lord Manufacturing Company, Brooklyn, N. Y., has issued a post-card folder describing its Multi Vapo Gap lightning arrester.

J. H. Parker & Son, Chelsea, Mass., have issued a catalog describing and listing their various porcelain insulations for both wet and dry use.

Allgemeine Elektrizitäts-Gesellschaft, Berlin, Germany, has issued a pamphlet describing its section insulators and other overhead line switching devices and fittings.

L. B. Stilwell, New York, N. Y., consulting engineer, has issued a catalog entitled "Twenty Years' Progress," describing and illustrating important engineering works designed and supervised during the past twenty years by engineers associated with this firm.

Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa., has issued Folder No. 4187, describing its type KB section insulator. The iron parts of this device are sherardized, and wearing parts are renewable. Leaflet No. 3569 describes and illustrates the shipment of transformers in tanks with oil.

Canton Culvert Company, Canton, Ohio, has published a pamphlet describing the remarkable results obtained with its "Duro" perforated corrugated metal railway drains, which are made of double-galvanized anti-corrosive metal. A drain of this type installed in 1909 near the Pennsylvania Railroad main line tracks under a heavily traveled paved street in Pittsburgh, Pa., was recently examined by a track supervisor and one of the manufacturer's representatives. It was found to be in perfect condition after more than three years' service, in spite of the fact that the ground at this point is full of cinders and that there is much seepage of acid water from the washing of cars and drippings of side-tracked engines.