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The Convention Exhibits

Recent visits of representatives of this paper to Atlantic City have given opportunity to study on the ground the preparations being made for the display of the exhibits at the coming convention, and it is very conservative to say that in this particular the convention will surpass any previously held. The committee in charge of exhibit matters has wisely decided that the booths and other accommoda-

tions for exhibits shall be ready far enough in advance of convention time to avoid the necessity for haste in installing the various products to be displayed. In number, the exhibitors this year will at least equal that of the very successful convention of last year, and will occupy with their exhibits about 60,000 sq. ft. of floor space. It is also evident that this convention will be notable not only for the extent of the exhibits but for their attractiveness. A decorative scheme will uniformly be followed, and so much care in advance has been given this feature that the results must far exceed those of former years. The expenditure for a uniform decorative scheme is larger than usual, but the results will justify the outlay. Another important innovation this year is the "In-and-Out" booth, where the Manufacturers' Association will be prepared to keep an hour-to-hour record of the whereabouts of all convention delegates and visitors. The scheme of operation of this booth requires the co-operation of the delegates, but in return for this aid many valuable appointments may be kept, and thereby the convention will better fulfill its purpose of mutual advantage. The Manufacturers' Association has worked hard for a successful meeting, and its efforts will be appreciated during convention week.

Utility of the Portable Substation

One of the chief reasons why portable substations have won favor with some railroads is that of utility during construction and extension periods before the time of completion of the regular stations. Such portable plants also are available for use in handling centralized loads and thus relieving the regular equipment of severe overloading in times of special traffic. There has just come to notice a new situation in which a portable substation is put to good use in still another way. The Detroit United Railway has, among other suburban lines, one extending about 70 miles northwest to Flint, Mich. This is a single-track line operated by direct current, supplied from a number of substations and from direct-current power plants. A considerable amount of freight and other heavy, voltage-reducing loads are handled on this line. To provide a good power supply at the time of these excessive loads a portable substation is used which does service in supplementing the motor-generators at the permanent substations. At times the general load on this division is well distributed and yet on account of the nature of the load the division of capacity between the a.c. and d.c. apparatus is not all that could be desired. Then the portable substation may be used to a good advantage. The direct-current feeder system in Detroit is ample to maintain good voltage into the suburban territory, and the portable substation is placed at the outer end of the direct-current feeding system and there thrown

into service as a balance between the a.c. and d.c. feeders of the interurban line. When an excessive load comes on the direct-current feeders of the interurban line, the unit in the portable substation assists in feeding direct current. When the substations at the outer end of the interurban division demand an excess of alternating current, the portable substation apparatus in turn takes current from the trolley network, converts it and through its transformers feeds the transmission line to assist the a.c. transmission system. Thus the portable substation frequently is put to good use when it is not needed in handling centralized loads.

A Study of the Scrap Pile

At the last meeting of the New York Railroad Club a paper was read on the possibility of reducing the cost of locomotive operation by careful supervision of the issue of supplies and of the material scrapped. It was suggested that by differentiating in the patterns of the tools supplied to the locomotive engineers and to the shop men, as by making the engine chisels with a hexagonal shank and the shop chisel octagonal, and by giving the handle of the hammers and of the brooms a slightly different shape according to the use to which they are to be put, appropriation between the different departments would be discouraged. This would make each department more careful of its own supplies and would localize the responsibility for high supply expenses. To prove his case the author quoted some figures on the cost of locomotive supplies among different railroads, and they certainly showed a wide variation. One large company spent less than \$40 per locomotive per year for miscellaneous supplies, while on another the cost was more than three and a half times as much. Especial attention was also directed in the paper to the importance of inspecting the scrap and saving such part as could be utilized.

Conditions similar to those described by the author of the paper undoubtedly exist to a large extent on many electric railways. As in the steam railroad business, the managements have been so busy during the last three years caring for the traffic that small economies have had to be overlooked. The suggestions about the need of watching the issue of supplies so as to prevent their lavish use apply equally in steam and electric railroading. There is no doubt, also, that the scrap pile affords equal opportunity for a dissipation of a company's earnings. With the demands on the time of the men in the average railway shop, it seems, and is, often economical for the men engaged on a job to install a new part for one that is disabled. This does not mean that the discarded apparatus should be definitely and finally scrapped, unless some one competent to judge has determined that its entire period of usefulness has passed. If one man who understands his business is assigned to the duty of passing on junk, he can often save many times his wages. He should not only be a mechanic but an engineer as well, or at least he should possess engineering instincts, because his duty will be quite as much to prevent defects as to repair them. That is, the constant recurrence of the same trouble in any one part would suggest either poor design or misuse, or both. After the cause of the trouble has been determined, plans for its remedy can follow. It will even pay the manager well to inspect

the junk pile frequently. His wider knowledge of the needs of the system will often permit him to see uses for the discarded copper wire, copper castings, brush holders, brake shoes and trolley wheels other than by selling them for old metal, or else will suggest some direction in which a longer life can be secured through a change in design or use.

The Technical Side of the Convention

It is now a little more than a week until the conventions of the American Street & Interurban Railway Association and its affiliated associations take place at Atlantic City. The prospects for a large attendance of delegates from street railway companies is excellent. It was found at the last conventions of the master mechanics and car builders of the steam railroads that the depression in the railroad business had no deterrent effect on the number present at those conventions. On the contrary, there was a larger attendance than ever before, because the officers of the different companies had fewer demands on their time at home and could take the opportunity of meeting and engaging in association work. Whether this same condition will hold true in electric railway companies remains to be seen. But every indication at present points to a larger number of electric railway officials at the convention at Atlantic City than a year ago.

Advance copies of many of the papers of the Engineering and Accountants' associations have been mailed to member companies and are ample evidence of the work during the past 12 months of those to whom subjects were assigned. A notable feature of the program of the Engineering Association is that all of the topics this year will be treated by committee reports rather than in what are known as papers. This does not mean so much a change in form of the thesis presented as the fact that the information has been collected by several members of the association rather than one and bears the endorsement of a committee. The program of the Transportation & Traffic Association contains a novel feature in the symposium on the possibilities of a well-conducted publicity department, which will take the form of five papers to be presented on Wednesday morning. The contributions are from as many sections of the country and indicate the extent of the interest which is being taken by electric railway companies in the promotion of traffic. Up to within a comparatively short time steam railroad and navigation corporations alone among transportation enterprises have had departments which devoted their entire energies to the cultivation of business. Electric railway companies did not consider it necessary to do more than care properly for that which came to them without special solicitation. This idea has now largely passed away and the meeting on Wednesday, at which this subject is to be discussed, promises to be one of the most instructive of the entire convention. The Transportation & Traffic Association has decided not to publish its papers in advance, but copies of the reports of its committees will be available at the meetings of the association to assist the audience in following the speaker. The same plan will be followed at the Claim Agents' convention, which will provide an attractive program for those interested in the legal and claim departments of electric railway companies.

No provision which could add to the success of the meeting has been omitted by those in charge and the time selected is one during which Atlantic City is a most attractive place to visit. The association has usually been favored at its annual meetings with pleasant weather, but this year is less dependent upon the favor of the elements than ever before. Even if inclement they will not interfere with a comfortable inspection of the exhibits or the meetings, since the New Million-Dollar Pier at Atlantic City is protected by roof and side walls. Those who cannot or do not attend the 1908 convention will miss an opportunity.

Through Tickets on Short Run Cars

Every company which operates a service to an intermediate point of a long interurban line may be confronted with the problem of what to do with a passenger who wishes to travel to the end of the line, but who boards a car which goes only part of the way. The legal status of the company in a case of this kind was defined recently by the Supreme Court of the State of Washington before which it had come in a claim for damages because the passenger had been ejected after declining to pay another fare. The case was that of *Mills vs. the Seattle, Renton & Southern Railway*, an interurban line, on which tickets are sold. The plaintiff had purchased a through ticket to Ranier Beach, the end of the line, but boarded a car whose destination was Ocean Beach, 2 miles nearer Seattle than Ranier Beach, although the destination of the car was distinctly marked. He asked no questions as to the destination of the car and no information was given him upon this point. After the car reached Ocean Beach, and after his ticket had been taken up, he was informed that he must leave the car. He demanded a transfer or some other evidence of his right to take another car to his destination at Ranier Beach, but this the conductor refused to give, and had no authority to give under the rules of the company. The plaintiff remained on the car, which started on its return trip. Soon after, a conflict arose between the passenger and the conductor, and the former was ejected. He brought suit for damages for ejection and also for assault, which he said had been committed during the ejection by the conductor and by one of the company's track greasers, who was on the car and who assisted the conductor.

The Court held that, in spite of the fact that the ticket read that it was good to Ranier Beach, the company was not required to run all of its cars the entire length of its line, or to provide for the transfer of passengers from one car to another. Its entire duty was to run its cars as would best serve its own convenience and that of the traveling public, and that it could properly require passengers to take such cars only as would transport them to their destination without change. The mistake of the plaintiff was not one for which the company was responsible, and when he declined to leave the car when it had reached its destination he became a trespasser and could be ejected with such force as appeared reasonably necessary. The law in this case, it stated, is clearly defined in the case of *Clark vs. Great Northern Railroad Company*, 37 Wash. 537, 78 Pac. 1108: "The rule is that in removing trespassers from a train, the employees of the company may use such force

as appears reasonably necessary, under all the circumstances, to accomplish the end in view; and, if the trespasser offers forcible resistance, a jury should not weigh with too much nicety the degree of force resorted to."

There was some testimony to show that the force used had been greater than necessary, but the Court held that whatever had been the actions of the conductor, the company was in no event liable for the assault committed by the employee called the "greaser." Although employed by the company, he had nothing to do with the operation of the cars or with the receiving or discharge of passengers, and that if he committed an assault it was without the scope of his employment, and the company could not be held liable for it unless his assistance was at the express or implied request of the conductor. In other words, the company was no more responsible for his actions when off duty and acting apart from his regular occupation than it would be for that of any person not employed by it.

Interstate Business a Defence Against Municipal Taxation

An interesting case involving the right of municipal authorities to tax interstate electric railways was decided by the Supreme Court of Georgia recently in case of the *City Council of Augusta et al. vs. the Augusta & Aiken Railway Company*. The latter is an interurban electric line extending from Aiken, S. C., to Augusta, Ga., and entering the latter city over the tracks of the *Augusta Railway Company*. Some three years ago, the City Council of Augusta concluded that it wanted more money for municipal purposes, and passed a law requiring all persons or companies engaged in business or professions in the city to take out a license. Among other corporations affected by this law was the *Augusta & Aiken Railway Company*, from whom \$1,666.66 was demanded for the privilege of running its cars through the streets of the city. The company protested against the assessment of this tax, as it was not doing an intrastate business. In 1903, it had been granted the right to use the streets of the city under an ordinance which exacted no terms and imposed no restrictions outside of the contract made between the interurban and the city railway companies, and which neither reserved nor surrendered any power to tax.

The Court held that the municipality sustains a dual relation to its streets and thoroughfares—that of a sovereign and of a proprietor. In its latter capacity the city can exact toll or rent for the use of its streets, but when such a rent had been fixed it becomes a contract and the rate cannot be arbitrarily increased. It is true that where companies engaged in interstate commerce carry on a business which justifies police supervision, a municipality is not obliged to supply such supervision for nothing, but it may, in addition to the ordinary property taxation, subject the companies to reasonable charges for the expenses involved. The wording of the Augusta ordinance, however, indicated that its purpose was not to charge for municipal supervision, but was distinctly a tax on the occupation and business of carrying on interstate commerce, and this the city of Augusta was without the power to impose. If the company had also done intrastate business, it is possible that the Court might have taken a different view, but as this was not the case, the question was not considered.

When a Transfer System Becomes an Abuse

It was undoubtedly with the intention of surprising and confounding Oren Root, Jr., that the Public Service Commission of the First District called his attention, during a hearing before the commission last week, to certain views expressed by him in an article entitled "Transfers and Transfer Problems, with Special Relation to New York," published in the *STREET RAILWAY JOURNAL* of Oct. 5, 1901. At that time Mr. Root was assistant general manager of the Metropolitan Street Railway, of which he is now general manager. It is not especially material to the present discussion that the methods of the commission in directing the attention of Mr. Root to this article savored somewhat of the characteristics of a criminal lawyer engaged in attempting to wring incriminating testimony from a witness. In presenting the expressions of opinion in this article to Mr. Root the chairman of the commission, perhaps naturally, selected those portions which would be most likely to point to the desirability of a universal transfer system on Manhattan Island. There also seemed to be a feeling that it was strange that the opinion of Mr. Root as to the desirability and profitableness of universal transfers from the standpoint of the company should have undergone a change in seven years.

It should be borne in mind that the transfer conditions existing on Manhattan Island just prior to the appointment of receivers for the surface lines were very different from those which prevailed when the article in question was written by Mr. Root. In referring to the Third Avenue Railroad, which has only recently been segregated from the Metropolitan system, Mr. Root wrote in 1901: "In this article it is not the intention to treat of the Third Avenue system. * * * As these lines have been lately acquired, they have not constituted a factor in the history and development of the Metropolitan system; moreover, before they came under the control of the Metropolitan they had made a contract for the exchange of transfers with the elevated road which prohibited them from entering into transfer agreements with any other company. Consequently the Third Avenue line exchanges transfers only with its own lines." That is, Mr. Root was considering the effect of the transfer scheme which existed before it was extended to include the Third Avenue Railroad and its controlled lines. At that time also the Twenty-third Street and other cross-town lines belonging to the Metropolitan system did not issue transfers to all of the longitudinal lines. Subsequently the construction put upon the law by the courts required that an exchange of transfers be made between all lines in the Metropolitan system, including those in the Third Avenue system. The losses to which this universal transfer system gave rise were undoubtedly a factor in the ensuing financial troubles of the properties.

Mr. Root said in the article that under the old system, which had been superseded by a new and what was believed to be a better arrangement a few months prior to the time when his words were written, the demand for increased transfer facilities had been met by allowing greater privileges, until it was possible to travel from practically any point on the Metropolitan system to any other for a single fare. The conditions of which the receivers of the Metropolitan Street Railway Company have complained

since their appointment in 1907 and prior to the beginning of segregation of various lines, were entirely different and amounted to what were practically universal transfers at any intersection, accompanied by great abuse of the privilege. In other words, during about six years, notwithstanding the efforts of the company to confine the system to legitimate use within reasonable limits, it had grown, owing to the consolidation of lines and rulings of the courts, to the point where there was practically no limit either as to time or place. In March of the present year, when F. W. Whitridge had been appointed a separate receiver for the Third Avenue road, he sent a petition to the United States Circuit Court asking for authority to discontinue transfers with the Metropolitan system. Mr. Whitridge said in his petition that for 10 cents a person could obtain practically a free pass for a day, good over all the surface lines of New York City. The existence of conditions of this character would jeopardize the solvency of any business.

The primary object of the inquiry during which Mr. Root was examined regarding his article was to arrive at a fair basis for joint rates and through routes between the Metropolitan Street Railway and the Central Park, North & East River Railroad, and particularly the Fifty-ninth Street crosstown line of the latter system. The intent of the commission plainly was to show that Mr. Root favored transfers in 1901 and that he did not favor universal transfers in 1908. Mr. Root made it perfectly clear that a restricted transfer system was not undesirable. We think, with Mr. Root, that a mind is given individuals for the purpose of use. An opinion that cannot be changed by differences in conditions or by the march of events or experience is not worth having.

The strongest argument which electric railways can advance in questions of public importance relating to fares and transfers is the actual cost of operation of properties. The cost is not accurately stated if it does not provide that renewals shall be made from earnings. To what extent, if any, the earnings should bear the losses due to supercession is a question which the railways must work out, with the sanction of the public regulating bodies or the courts. If improvements in properties take place, and the public desires to secure benefits therefrom, it must expect in some way to bear a tax calculated to afford a reasonable return upon the investment. Since the cost of operation is an important factor in the earnings of a railway, it is necessary to inquire, in connection with a discussion of the present subject, whether those costs underwent any change from 1901 to 1908. If such a change took place, are the true costs of operation higher or lower at the present time than in the earlier year? We think that no observing man, whether he be a railway official or a member of a public service regulating body, can truthfully deny that substantially all costs, both for labor and materials, for corporations as well as for individuals, have advanced materially in the last 7 years. To argue that an opinion founded upon conditions of 7 years ago may not be changed in the light of the situation of to-day would be to argue without that analytical reasoning which is needed to solve the pressing problem of coupling a reasonable transfer system with fares that will yield a fair return.

The Predetermination of Train Resistance

Of making resistance formulæ there is no end. From the earliest efforts of the pioneers in railroading there has been constant and generally fruitless discussion on how best to determine a relation between the weight hauled and the power required. As speeds grew higher air resistance, at first negligible, became of more and more importance, until now it is given a commanding place in all rational formulæ. The form of equation for total resistance has varied from time to time, but there has not been, until within a few years, any serious attempt to obtain a full analysis of the various factors involved. The earlier equations were generally of the form $R = A + Bv^2$. Later, as higher velocities were examined, it turned out that the first power of v must be considered, and the equations dropped into the generalized form $R = A + Bv + Cv^2$, which will at once be recognized as the beginning of the ordinary Maclaurin series, which goes on to v^n , if necessary. Still other investigators have gone into series with non-integral exponents. The student of graphics will see at the first glance that nearly all the resistance formulæ are merely familiar devices for writing down the empirical equation to an experimental curve of simple character. In point of fact unless one deals with a considerable range of values of v , the experiments can be treated successfully by even a series of straight lines, $R = A_0 + B_0v$, $R = A_1 + B_1v$, and so on. Even in the famous Zossen tests a straight line equation can be made to represent the experimental points very well for considerable distances.

In recent years there has been activity in adjusting the formulæ so as to give the coefficients real physical meaning, and one of the most interesting we have seen is that recently made by Carus-Wilson in a paper before The Institution of Civil Engineers.

Taking the common form of equation, $R = A + Bv + Cv^2$, Prof. Carus-Wilson goes into its analysis, and in particular devotes his attention to the coefficient B of the first power of the speed. A is known to include journal friction, and perhaps other frictional elements; C is chiefly air pressure, not yet resolved into its details very thoroughly, but regarding the physical character of B little has hitherto been made out. The striking point made by Prof. Carus-Wilson is that the flange action due to the oscillation pressure of the truck wheels against the rails is proportional to the first power of the velocity, and makes up the bulk of the term in B . The action referred to introduces incidental flange friction, but is chiefly made up of oscillations impressed on the heavy truck. An analysis of various experimental runs of different investigators with trucks of different kinds and weights seems to show the general soundness of the contention, although, as in other attempts to analyze train resistance, the various factors are difficult to separate. It is obvious that the quantity B must have some definite reason for being, and it is also well known that B does depend on the character of the rolling stock. In the Zossen work the matter of truck oscillation was found to be serious at high speeds, and the importance of truck balancing was strongly emphasized. In the discussion many facts pointing in the same direction were brought out, and cases were cited in

which flange friction from a cross wind and its allied effects were almost enough to stop a train. It is also worth noting that the variations in apparent train resistance, particularly as between medium and high speed, point to the existence of just such a factor as B is here alleged to be. From this point of view the fact becomes conspicuous that resistance coefficients must vary very widely with the nature of the rolling stock, and that attempts to estimate it in terms of the length of the train, the number of cars, and so forth, are only rough approximations that cannot be expected to hold unless the rolling stock is similar. It is also apparent that it may make a considerable difference whether the cars considered are acting as motor cars with driving wheels, or as drawn vehicles. This change of condition may be one of the reasons for the discrepancies between the resistance values obtained by coasting and by other methods.

We have always been inclined to the opinion that coasting experiments with motor cars are subject to several causes of error which are not easy to eliminate. A better plan seems to us to be the towing of trailers from a dynamometer car with a very long cable supported, if necessary, by pony trucks. By such a plan the cars are always pulled steadily at the front, but remain freely exposed to the air and wind. Wind pressure, which affects the third term of the resistance formulæ, seems still to be under discussion, though it should have been set at rest by the Zossen tests so far as the values at high speeds are involved. A recent paper before the Institution of Civil Engineers by Stanton reports the results of a new series of experiments on wind pressure in which the value 0.0027 was found for k in the ordinary equation $P = kV^2$. This corresponds very well with the Zossen figure and also with the theoretical value $k = 0.00255$ deduced by Professor Ferrell. In spite of this we still hear cited the old values for k which approach 0.0035 or 0.004 which should certainly be laid on the shelf for all time. The fact is that as speeds rise in actuality the power required is pretty generally found to be less than had been feared. If the rolling stock and tracks are suitable for high speed the apparent air resistance will not run to forbidding figures. There is still need, however, for study of the best shapes to be given to bow and stern of trains to keep down the air resistance and much further attention is needed to the question of side and vestibule resistances in a quartering wind. A practical train is very far indeed from being a smooth body of definite shape and the eddies around it even when running in still air are very little known. That the effects of side wind pressure may overshadow all the other resistances at times is very well known, but the nature of the whole action and the possible remedies have been too much neglected. True, the 100-m.p.h. train that has been so long promised is not yet in sight around the curve of time. It will not come until some fearless railway man from a mixture of motives attempts it. Then between protests the rest of the crowd will have to make up their minds to follow the example and from that moment there will be hustling for which as yet no adequate preparation has been made. It is high time to investigate these vital problems of high-speed work, so that when the hour for action arrives engineers will be ready for it.

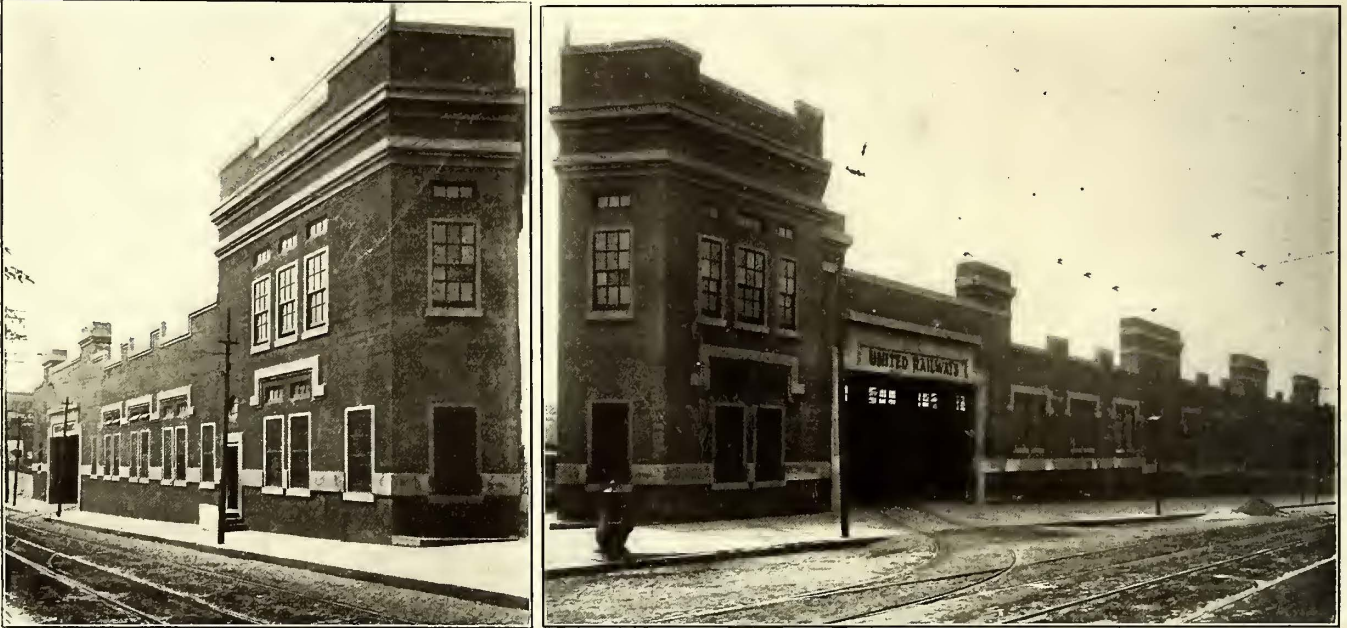
THE GAY STREET CAR HOUSE OF THE UNITED RAILWAYS & ELECTRIC COMPANY, BALTIMORE, MD.

During the last three years the United Railways & Electric Company, of Baltimore, has completed a series of fireproof car houses which embody many noteworthy improvements in this department of electric railway work. The structures deserve attention for something more

last will be treated in this article. The fourth and fifth structures will be known as the Harford Avenue and Park terminal depots, respectively.

GAY STREET CAR HOUSE

The Gay Street car house fronts 350 ft. on North Avenue and 174 ft. on Gay Street, although the depth of the structure is only 125 ft. The long front on Gay Street is

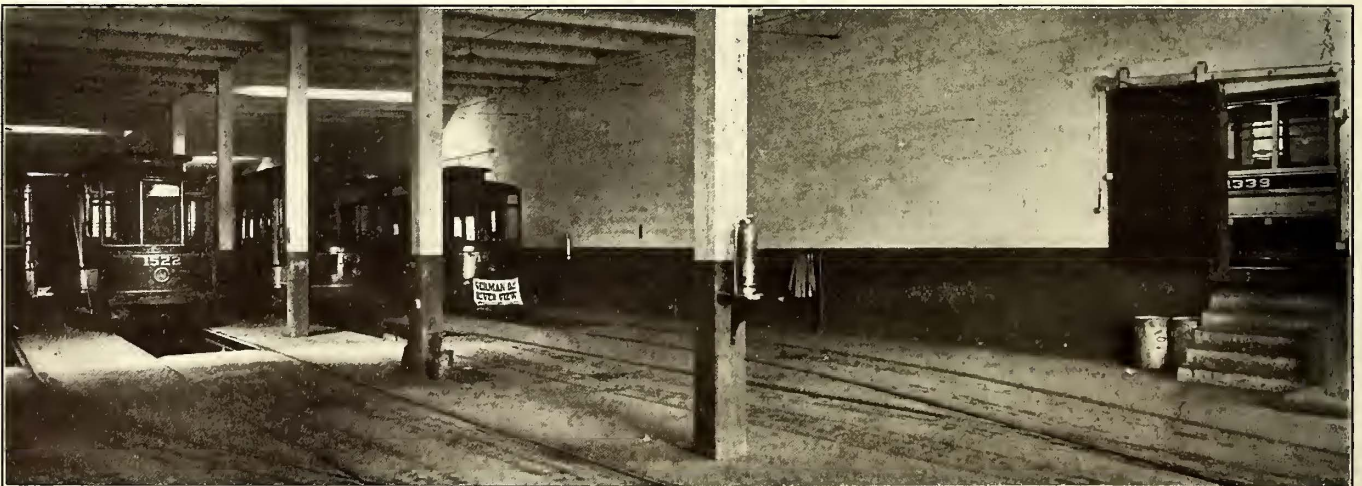


Car Houses in Baltimore—Views Taken Along the Gay Street and North Avenue Sides of Gay Street House

than their utilitarian features, since their artistic construction makes them worthy monuments to the civic patriotism aroused among Baltimoreans by the great fire of Feb. 8, 1904. The railway company probably was the greatest individual loser through this catastrophe, yet it went ahead with the determination to give its public the best service possible.

Plans were drawn up for seven car houses, of which

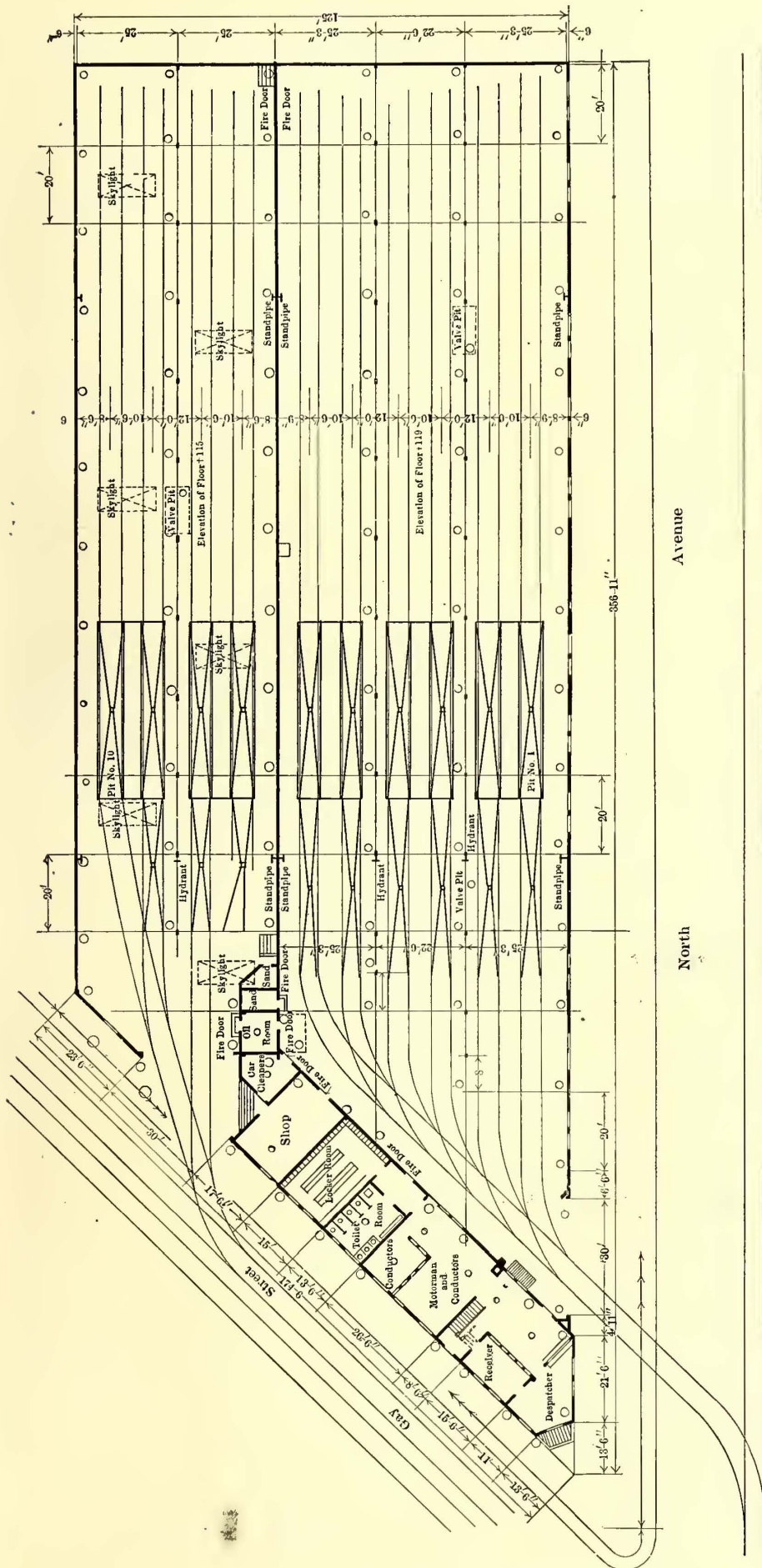
caused by the angle formed at the intersection of the two streets. The building proper covers an area of 37,000 sq. ft. and is divided into three sections, namely, the service section and two car houses, one with an entrance from Gay Street and the other with an entrance from North Avenue. The floor elevation of the Gay Street section is 115 ft. and of the North Avenue section 119 ft. The single stairway entrance between these sections is protected



Car Houses in Baltimore—Interior of Gay Street Section—Stairway and Fire-Door Opening to North Avenue Section

five have been completed and two are in abeyance. The car houses first placed in service are located respectively at Edmondson Avenue and Electric Park, and were fully described in the *STREET RAILWAY JOURNAL* of Feb. 2, 1907. The three finished in 1908 are the Highlandtown, York Road and Gay Street car houses, the first two of which will be described in the forthcoming Convention Edition of the *ELECTRIC RAILWAY JOURNAL*, dated Oct. 10, while the

by firedoors, as in the rest of the structure. The peculiar topographical conditions at this location required that the track entrances be unusually narrow; thus the four-track Gay Street section has but two entering tracks, and the six-track North Avenue section only one. It is fortunate, therefore, that such precautions have been taken to have a fireproof structure, as it would be extremely difficult to run out the cars rapidly through the few exits. All of the



Car Houses in Baltimore—General Floor Plan of Gay Street Car House, Showing also Partitions and Skylight Location

tracks in both portions are furnished with flush aisle pits of the type described on page 181 of the STREET RAILWAY JOURNAL of Feb. 2, 1907.

The service section occupies the Gay Street front of the North Avenue car-house section, which is the larger of the two divisions for the storage of cars. This service section can be entered from both streets as well as from both of the car-house sections, which together accommodate 54 cars. The dispatcher's office has been located in the corner of the streets, in order to permit an unobstructed view to both car-house entrances. The line superintendent's office adjoins the dispatcher's office, and is followed by the general room assigned to the motormen and conductors. The conductors are provided with a special room, entered from the general room, in which they can make up reports and accounts without disturbance from others. An ante-room gives access to the locker and toilet rooms. The former contains metal lockers, one for each employee, and the latter is equipped with nicked sanitary plumbing fixtures and porcelain basins of high-grade manufacture. The employees' lounging room has been located on the second floor, where they may have recreation and comfort during hours of freedom. The shop containing material and tools for minor repairs is located between the two car-house sections, as well as the sand, oil and car-cleaners' rooms. The sand rooms adjoin, but are on different levels.

The building is constructed entirely of reinforced concrete, having not only the usual concrete skeleton frame, consisting of columns, girders, beams, floor and roof slabs, but also concrete walls. The roof is of slag; all windows have metal frames and wired glass; all doors have a standard self-closing attachment. The offices and rooms, as well as the track pits, are heated by steam pipes, and the entire building is lighted by incan-

descent lamp clusters. The pits are lighted by wire-guarded incandescent lamps placed in wall recesses. The building has been equipped with a complete hose standpipe system, with Siamese steamer connections, and the underground piping for a complete sprinkler system. The Edmondson Avenue car house was supplied with sprinklers at once, but

tint, and the smooth of a lighter gray color. The window and door frames, as well as the sash, have been painted with vermilion, and, while this is a departure from the stereotyped bronze or bottle green, the contrast is striking and artistic, and the building is a decided improvement to the locality.



Car Houses in Baltimore—One of the Bays in the York Road Car House, Showing Track Construction Required Owing to Facilities Room at Entrance

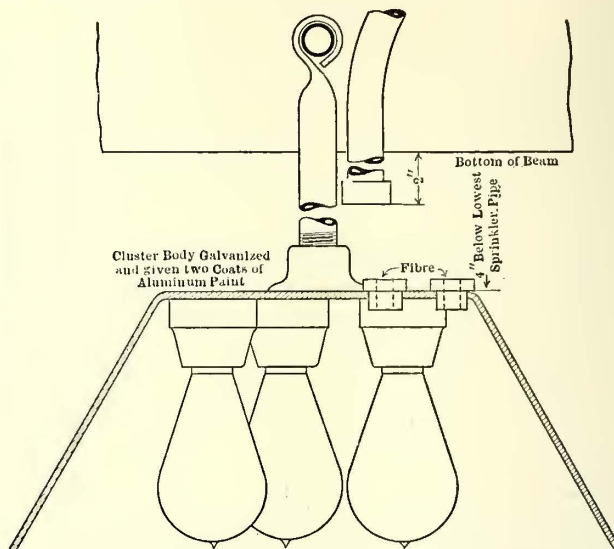
in the later car houses only such piping has been installed as will preclude breaking up the concrete when the company decides to complete the system.

Owing to the steep grades of the adjacent streets, the design had to overcome the sightly aspect of a long, low, squatty appearance, and the architects succeeded in introducing the corner second-story assembly room, and treating the same as a tower, which is well balanced and connected by the embattlements of the parapets. The latter are carefully repeated, thus giving the building a well-proportioned tout-ensemble. The design is unique, and the



Car Houses in Baltimore—Conductors' General Accounting Room and Lunching Quarters for Carmen at Highlandtown

finish, moldings, belt courses and copings especially profiled and adapted to the reinforced concrete construction. The exterior wall covering is of what is known as "Moustick" finish, which resembles a rough cast, while the moldings, sills, belt-courses, etc., are treated with a smooth finish. The color of the "Moustick" finish is of a greenish



Car Houses in Baltimore—Cluster of Incandescent Lamps for Roof Lights

The architects for this structure were Simonson & Pietsch, and the contractor David E. Evans & Company, who started work during April, 1907. The laying of tracks and special work was done by the company's own forces, under the supervision of Engineer J. M. Hood, Jr. All work was subject to the final approval of W. A. House, president of the United Railways & Electric Company.

CONVENTION EXHIBIT ANNOUNCEMENT

The exhibit committee of the American Street & Interurban Railway Manufacturers' Association, Suite 1822, 299 Broadway, New York, has issued a bulletin dated Sept. 25 and containing important information for exhibitors at the Atlantic City convention. Through the active co-operation of the local committee all booths have been finished two weeks earlier than contract time. They are said to be complete in every detail, and the committee would like the exhibitors to make part or all of their shipments at once so that all the exhibits may be in place by Saturday, Oct. 10. Exhibitors are cautioned to ship according to the instructions recently issued by the committee. Arrangements are complete for the care and handling of shipments at Atlantic City. Shipments arriving Sunday, Oct. 11, will cost extra. Shipments arriving Monday, Oct. 12, or after will only be delivered during certain hours which will not interfere with the work of the convention. Orders for electric lights, signs, decorations, plants, flowers, etc., should be placed in advance. The bulletin says: "Let us all join together to make this the best and finest convention this association has ever enjoyed, and have everything completed Saturday night, Oct. 10. The exhibit committee is at your service." After Oct. 1 the office of the exhibit committee will be at the Million-Dollar Pier, Atlantic City, N. J. H. G. McConaughy, director of exhibits.

Bids will be received until Nov. 2 by the Direccion General de los Ferrocarriles del Estado, San Eugenio, Chile, for the supply of three 300-kw generators and other equipment for a 900-kw station.

CONSTRUCTION DETAILS OF NEW COMBINATION CARS BUILT BY THE NORTHERN ELECTRIC RAILWAY

BY J. P. EDWARDS, ELECTRICAL AND MECHANICAL ENGINEER OF THE COMPANY

The Northern Electric Railway Company has just completed and placed in service the fifth of six new combination passenger coaches which are being built at its shops at Chico, Cal. The accompanying illustrations and drawings will show the general design of this car.

The cars are of the double-end combination baggage and express type which is standard on this road and were especially designed by the writer to meet the service conditions. They may be operated either singly or in trains. The usual practice is to use one combination coach with one straight passenger trailer of the same general design as the motor car, although five-car trains are frequently operated.

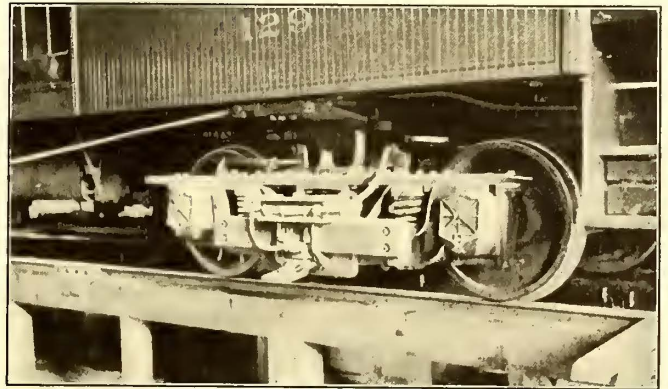
The general dimensions of the cars are as follows:

Length over buffers.....	56 ft.	
Length over vestibule.....	55 ft.	4 in.
Length over end sills.....	44 ft.	7 in.
Length between centers of trucks.....	33 ft.	6 in.
Length center of truck to end of bumper....	10 ft.	11 in.
Length of vestibules.....	4 ft.	9 in.
Length of baggage compartment.....	22 ft.	
Length of passenger compartment.....	22 ft.	
Width over all.....	9 ft.	2 in.
Width over side sheathing.....		21 in.
Length of seats.....		34 in.
Height from under sills to top of roof.....	9 ft.	6 in.
Height from track to top of roof.....	12 ft.	11 in.
Height from track to floor.....	4 ft.	1 in.
Weight of body.....		41,500 lb.
Total weight (approximately).....		80,500 lb.
Seating capacity		30

FRAMING

The lower framing is built up of steel I-beams with

is faced on both sides with continuous Oregon pine fillers, into which the cross girts are tenoned. At each cross girt is a 1-in. tension rod which extends through the webs of the side sills. The outside fillers are bolted to the beams with 1/2-in. carriage bolts, which are spaced about 2 ft. apart. The outside filler extends about 1/4 in. be-

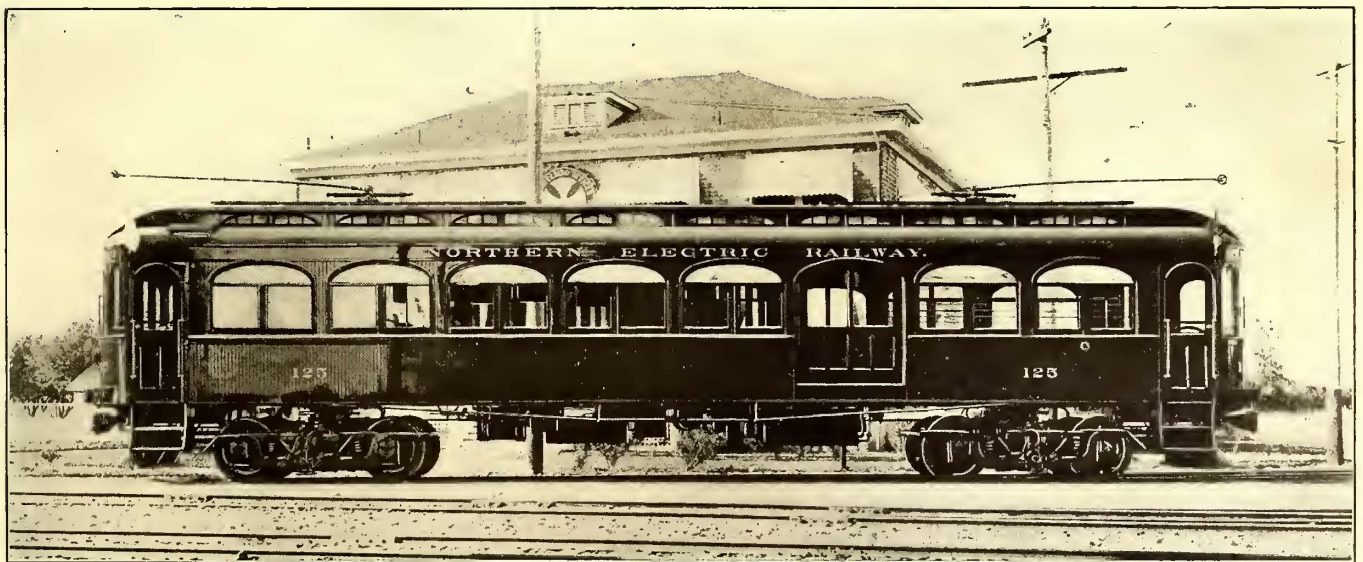


Northern Electric Cars—Side View, Showing Truck and Bolster

yond the edge of the flanges of the beams; this allowance is made for truing up the sides before putting on the siding.

Bolsters of the steel-plate type with cast-iron fillers are bolted to the bottoms of the sills and are independent of the framing, thus saving labor in case of removal. The top plate of 1 1/4-in. x 12-in. steel is turned over on the ends and machined to fit over the bottom plate of 1 1/2-in. x 12-in. steel, which, with fillers, gives a depth of 8 in. to the bolster. The center plates are of steel and are bolted through the bolster to the sills.

The end sills of the car are formed by riveting in short lengths of 6-in. channel, reinforced top and bottom with 1/2-in. x 4-in. plates running the entire width of the car. To these channels are bolted the 4 1/2-in. x 6-in. Oregon



Northern Electric Cars—Combination Passenger and Baggage Type

wooden fillers. The center and intermediate sills are 6-in. 12 1/4-lb. standard beams running full length of the car and terminating just inside of the 1/2-in. x 9-in. bumper iron. The two 8-in. 18-lb. beams which form the side sills are continuous and terminate at the end sills, thus leaving ample room for the step openings. Each beam

pine cross girts that extend out over the ends of the side fillers which are tenoned into them.

The side posts are 2-in. x 4 1/2-in. well-seasoned ash tenoned on the bottom to fit into cast-steel post pockets, which are riveted to the 8-in. beams, forming the side sills. A continuous plate of 3-in. x 5 1/2-in. Oregon pine extends to

the corner posts of the vestibule; also the belt rail is continuous and gained over the posts. At each single post and between each double post is a 5/8-in. tie rod extending from plate to sill. The nailing girts are 1 3/4-in. x 2 1/2-in. ash, and like the posts are rabbetted to receive the 7/8-in. blocking which is placed below the belt rail and between the double posts. The sheathing is 7/8-in. x 2-in. tongued and grooved redwood and is glued and nailed to the girts.

A wrought-iron truss is gained into the side posts in each end to strengthen the side sills beyond the bolsters; also a 1 1/4-in. truss rod extends between each bolster to carry the center.

The roof framing is of ash and built in sections and bolted to the 3/4-in. x 1 1/2-in. steel carlines which are placed over each double post. The sheathing is 7/8-in. x 2-in. redwood and is covered with No. 6 duck after being thoroughly painted. The deck sashes are Gothic and are hinged to the center posts opening outward on the ends.

The window sash are of mahogany glazed with 3/16-in. plate glass except the Gothic sash, which are glazed with a cathedral art glass. The baggage door is located back of the bolster so as to allow the use of the end truss under the belt rail.

INTERIOR FINISH

The passenger compartments and vestibules are finished in plain panels of mahogany, having inlaid lines of white holly, ebony and walnut, while the baggage compartment is finished in the same general design, except oak is used in place of mahogany. The ceilings are full Empire with Gothic deck sash and are covered with a three-ply maple veneer. Before placing on the headlinings the underside of the carlines were blocked with solid pine blocks and shaped to form the Gothic openings for the deck sash, which gives a most substantial foundation for them.

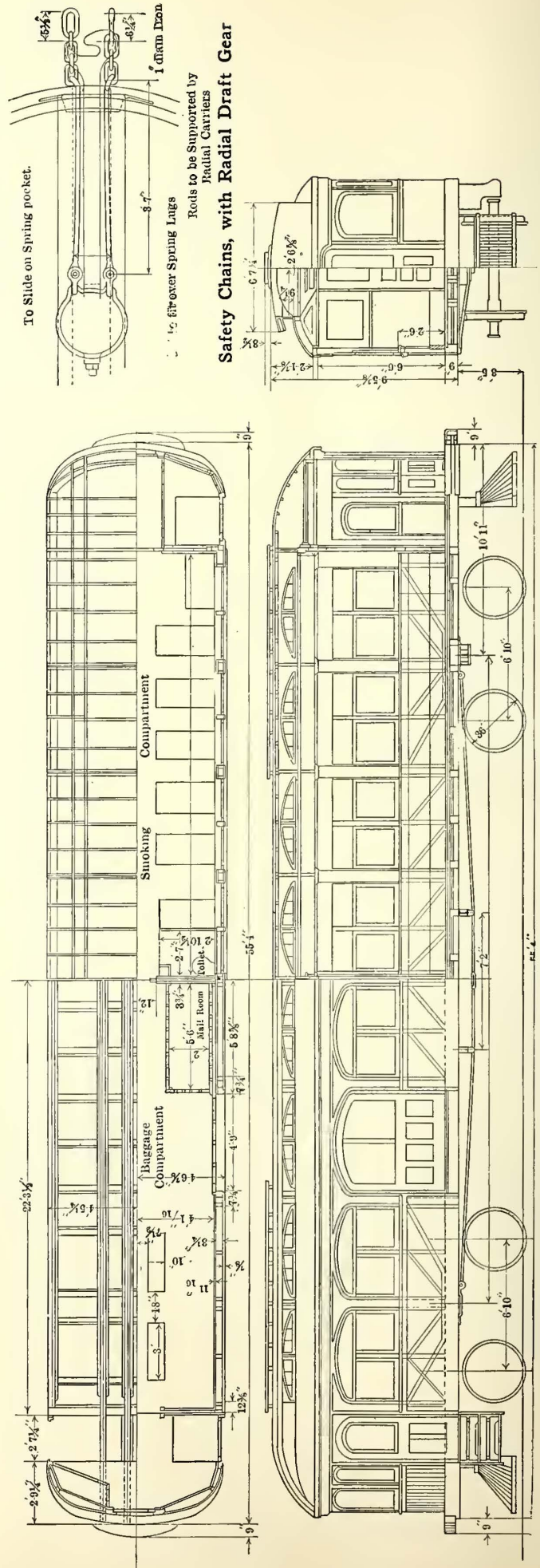
The saloon, located in the passenger compartment next to the partition, is fitted with a Duner combination dry hopper. In a small alcove at the side is the outlet of the stationary water cooler, which is located in the baggage room, where it is easy to fill and ice.

In each vestibule is a large swinging door hung on special hinges allowing it to swing through 180 deg. This door forms the motorman's cab and can be made to enclose the controller and brake valve when operating from the opposite end. It also allows free access to the vestibule from the cab by opening outward. The sliding vestibule doors swing inward over the trap door and are provided with drop sashes. The steps and entire vestibule floor are covered with rubber matting. In the motorman's cab on the baggage end is located a steel switch cabinet lined with transite and containing the lighting and pump switches.

The cars are painted a deep orange, which is the standard color, and striped and lettered in gold leaf. The interior of the car is varnished in natural colors and rubbed down to a dull surface. The headlinings are first painted a light shade of green and striped with a gold border before varnishing; afterward rubbed to a dull finish.

RUNNING GEAR

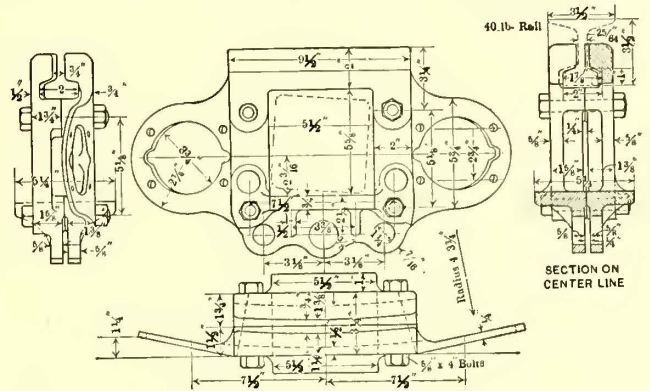
These cars are equipped with M. C. B. type trucks, built by the Baldwin Locomotive Works, model No. 200, having 36-in. standard rolled steel wheels with 6-in. straight turned axles, solid steel side frames and cast steel swinging bolsters, which are designed to carry 28,000 lb. on center plates. Each truck carries two Westinghouse No. 121 motors, which are rated at 85 hp each. The gear ratio is 24 to 51. On each side of the trucks, and hung on



extensions provided on the lower spring pockets, are the third rail shoes, each shoe being protected by a copper ribbon fuse. The standard contact shoes are of the slipper type, as shown in the detail view. The air brakes are Westinghouse automatic schedule AMM, with quick release and recharging features, and D₃ air compressor, which also furnishes the air for the control system.

The cars are equipped with the Westinghouse unit-switch multiple control system, having all the wiring except the terminals of the motor leads run in loricated steel conduit, fitted at all short bends and junctions with Condulet fittings. The car is made fireproof with reference to overheating of resistances by lining part of the underside with a sheet of transite fastened to a ceiling of matched lumber. The resistance grids are then hung on carrier irons and another sheet of transite placed on top of this, leaving an opening of 4 in. or 5 in. between the two sheets for free ventilation.

each end to illuminate the steps. The controlling switches of these lamps are placed in their respective cabs. The small lamps used to illuminate air gages are connected in series with the lights in the opposite ends, which enables the motorman to run with a dark cab. The headlight is the General Electric Company's inclosed-arc type "B," and

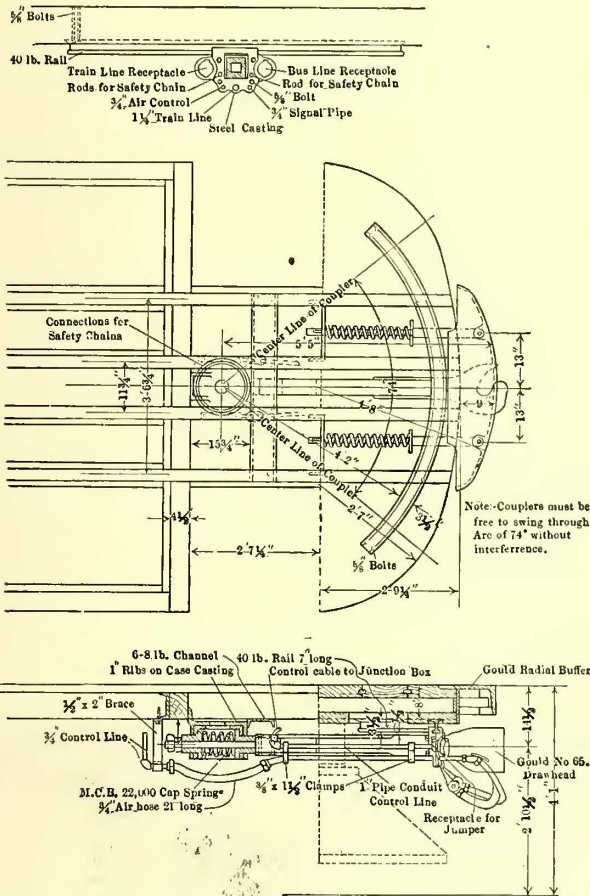


Northern Electric Cars—Steel Carrier for Radial Draft Rigging

is hung just below the letterboard across the end door of the vestibule.

EDWARDS DRAFT RIGGING

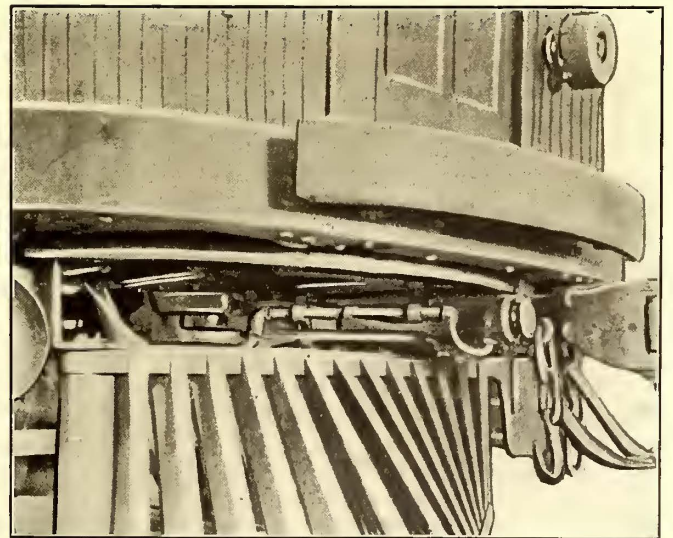
The draft rigging, which was invented by the writer, is of the radial type and is especially designed to meet the conditions of the traffic, namely, close connection between cars with spring buffer platforms, standard M. C. B. drawheads with automatic couplers, and short radius curves. It is possible with this rigging to take a train of two or more 56-ft. cars coupled together around a reverse curve of 40 ft. radius. The carrier for the coupler is composed of two steel castings, which fit over the ball of an inverted 40-lb. T-rail. The rail is bolted to the under sides of the I-beams which form the sills, thus giving a substantial track for the carrier to slide on, with no chance for sagging, as is often found in the old form of carrier placed under the coupler.



Northern Electric Cars—General Arrangement of Radial Draft Rigging

The master controllers are located in the corners of the vestibules and operated by the right hand of the motorman. The brake valve is placed near, and either can be operated easily by the motorman when he is looking out the side window of the vestibule. Between the controller and brake valve is the small valve controlling the sanders, which are of the Nichols-Intern type. The pump governor is located in the vestibule near the brake valve on the baggage end of the car and close to it is the pump cut-out switch.

The cars are lighted inside by four St. Louis interior arc lights, which are enclosed in large opal globes. These lights are connected independently in pairs so that two or all of them may be used at option. In each vestibule are three 16-cp incandescent lamps, and two are placed under



Northern Electric Cars—Coupling and Draft Gear Rigging

Attached directly to the steel castings is the coupler socket for the jumper of the electrical control system, and passing through the holes provided in castings are the different air pipes and safety chain rods. These rods go back and are fastened to a strap which passes around the pivotal bearing, allowing free play to the coupler and preventing the sepa-

ration of cars in case of a shank or tail bolt breaking. The engravings show this draft rigging very clearly in detail. The pilot, which is of the locomotive type, is carried directly underneath the radial carrier by a heavy iron brace. This brace also acts as a safety carrier for the drawhead.

The cars are equipped with electric heaters, which are placed between the seats on the truss plank. The seats are reversible, with high back and armrest on aisle end. They are upholstered in dark green pantasote and finished to match the interior woodwork. The curtains are also of pantasote and were furnished by the Curtain Supply Company.

In the baggage compartment is located a flag rack and locker for fuses, torpedoes, etc., and carried in a large toolbox suspended beneath the brake cylinder are the re-railing frogs, coupling links, chain, wedges, etc.

NEW CAR-HANDLING CRANE IN THE KANSAS CITY SHOPS

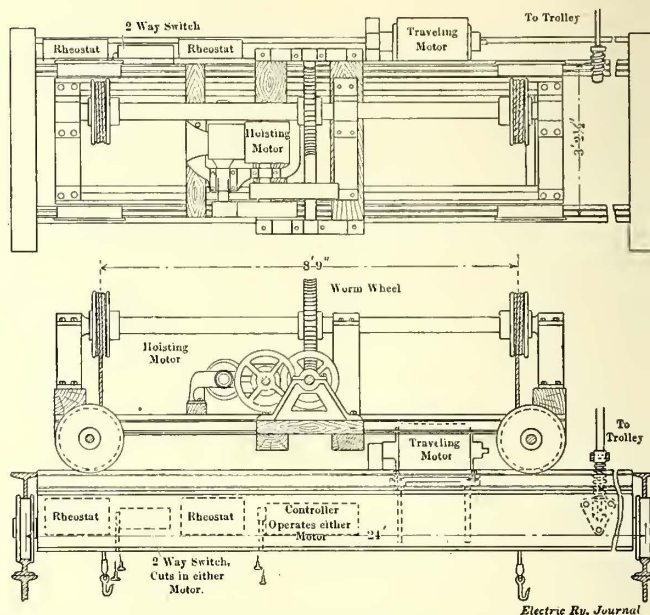
The shop equipment of the Metropolitan Street Railway, Kansas City, Mo., lately has been increased by the addition of an electric traveling crane. The carriage and hoist of this crane are interesting because they were improvised from materials on hand at the shops. The *ELECTRIC RAILWAY JOURNAL* is indebted to George J. Smith, master mechanic, for the accompanying illustrations and details.

The equipment for handling car bodies in the repair shop originally comprised a set of 16-in. pneumatic lifts mounted on trolley carriages running on 20-in. I-beams supported on runways 24 ft. between centers. The trolleys which carried these air hoists were moved by means of endless chains. The use of the air lifts was found unsatisfactory because the valves, as they grew old, showed a tendency to leak and the lifts would not always sustain the loads at the desired height without blocking. For these reasons electric hoists will be used instead of the air lifts over the same runways. Illustrations are presented showing one of these hoists in operating position and also plan and elevation.

The new crane comprises, as shown, two I-beams spanning the 24-ft. runway. On top of these I-beams are the track rails for the carriage which carries the hoisting and traveling apparatus. This carriage is mounted on four wheels with axles 1 ft. between centers. The wheels on each axle are 3 ft. 2½ in. between flanges. On the carriage is placed an F-30 motor with its armature at right angles to the carriage. In place of the car axle which originally extended through the housings on this motor, is a shaft and worm which in turn drives a shaft extending the full length of the carriage. On this long shaft are mounted two cable drums supporting the hooks by which car bodies are raised. These drums with their hooks are 8 ft. 9 in. apart. Thus, when the carriage is centered, the hooks may be lowered so that the car is between them. The speed of the lifting motor is such that with full voltage the travel of these hoisting cables is at the rate of 16 ft. per minute.

A 5-hp Fort Wayne motor mounted on the crane girders and connecting with the wheels by a gear shaft, controls the longitudinal movement. A considerable saving in control apparatus was made in building this crane by in-

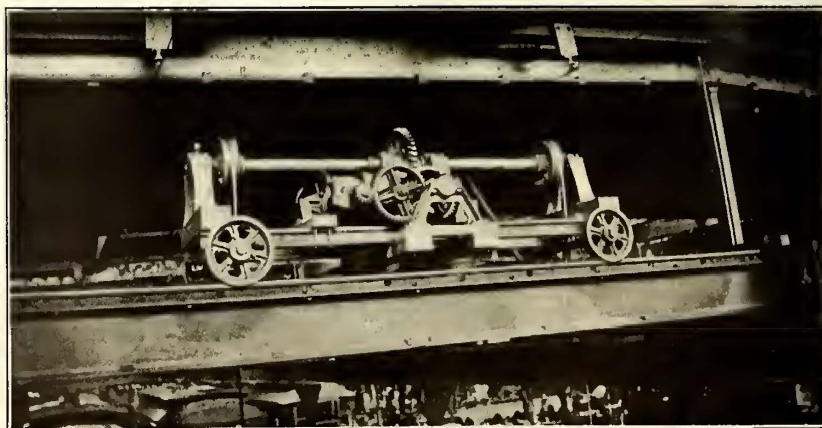
geniously utilizing a single controller for handling both the hoisting motor and the traveling motor. By adding two extra rows of contacts to a K-10 reversing cylinder it was possible to use a single controller for operating either motor. Of course, with this arrangement but one motor can be operated at a time. This is not considered a dis-



Kansas City Crane—Construction Details, Showing also Location of Electric Apparatus

advantage, however, because in handling the car bodies it would seldom be necessary to hoist them and move them along the runway at the same time.

In the electric control equipment a two-way switch is provided with operating cords which can be reached from the floor. When one cord is down this switch throws the reversing cylinder so that the hoisting motor is properly connected with the single controller, which also is provided with operating cords. When the other cord on the two-way switch is down the traveling motor similarly is connected in circuit with the controller. Each motor has its own rheostat.



Kansas City Crane—Operating View in the Shop

The Kansas City shops are now handling a considerable amount of extra work in reconstructing a large number of cars according to the pay-as-you-enter plan. In this work the electric crane has shown itself to be very useful and so far has not failed to fulfill the requirements of its designer.

HEARING ON PROPOSED JOINT RATES AND THROUGH ROUTES IN NEW YORK CITY

The hearing in connection with the desire of the New York Public Service Commission, First District, to have joint rates and through routes established by the Metropolitan Street Railway and the Central Park, North & East River Railroad of New York was resumed on Sept. 22. Oren Root, Jr., general manager for the receivers of the Metropolitan Street Railway, took the stand.

In response to questions from Leroy T. Harkness, who represented the commission, Mr. Root said that he had not reached any conclusion as to the extent of the benefits accruing to the receivers from the abrogation of the lease of the Central Park line. When asked what elements would enter into a computation intended to facilitate a conclusion, Mr. Root said that some of the important considerations to be investigated would be the increase in revenue of the Metropolitan lines over that received prior to the abrogation of the lease, the average fare of the entire system, and the number of passengers that paid more than a single fare.

In answering an inquiry as to whether the receipts of the different lines in the system had been kept separately, Mr. Root said his understanding was that the receivers had told the commission that they had been endeavoring to arrive at some means of keeping such accounts for some months, but that they were unable to do so even with the assistance of other parties in interest, such as the holders of different classes of bonds. The receivers would be glad to keep such accounts if any way to do so was pointed out by the commission.

Mr. Root said he did not believe sufficient time had elapsed to permit any conclusion as to the gain in revenue by lines that had been affected by the abrogation of the lease. He thought that the crosstown lines running parallel to Fifty-ninth Street, as the Eighty-sixth and 116th Street lines, ought to show the effect of the change perhaps more than other lines, but that as the business which would be affected was a small percentage of the entire traffic of the company, he thought it would be difficult to name the particular line to which most of the travel would be diverted. The effect would be more likely to show, in his opinion, in the revenue of the entire system.

Answering an inquiry by Commissioner Willcox, Mr. Root said that there seemed now to be an increase in the average rate of fare per passenger. This seemed to be true even after making proper allowance for the fact that autumn had arrived and a larger number of people required transportation than in the summer. He said, however, that unquestionably a number of people who formerly paid a single fare paid two, or perhaps three, fares now.

In speaking of the estimated figures of earnings submitted to the United States Circuit Court at the time the receivers asked for authority to abrogate the lease with the Central Park system, Mr. Root said that when the statement was made up he felt that in cases of doubt the Central Park line should be given the benefit of the doubt, because its operations were clearly unprofitable. Answering questions by Commissioner Willcox, Mr. Root said that he had made reports from time to time, giving his judgment as to the extent of the loss of fares to the railway because of the failure of conductors to collect from all the passengers or to give to the company all of the fares that were received. These reports were based partly upon

observation, partly upon facts learned from individuals who had been in the service, and partly and more largely from the study of the records of men assigned to ride cars and ascertain the facts. The last report on this subject, he said, was based on the observations of an agency which placed a certain number of men on the line. These figures were applied to the entire mileage. He would estimate that the proportion of fares not collected or collected and not turned over to the company represented about 8 per cent of the total traffic for which fares should be received. This was his opinion. He said that the percentage was variously estimated by other managers, but that it was entirely a matter of opinion. Mr. Willcox asked Mr. Root what the receivers had done to save the loss of 8 per cent due to failure to turn in fares on the Central Park (belt) line. Mr. Root said that the receivers had done everything in the power of any one to do. He said they tried to improve the personnel of the force, and they pursued "very vigorously and intelligently the introduction of the pay-as-you-enter car, which is the only known method up to date, so far as my knowledge goes, of lessening the loss." Mr. Willcox asked Mr. Root whether he thought it proper to tax the people of the city for the failure of the management to collect the fares of passengers. Mr. Root said that until passengers became honorable or conductors absolutely honest he thought that receivers did their part if they used all proper precautions and diligence known to minimize the result of failure to collect fares.

Mr. Root was asked the reasons that actuated the company in introducing the pay-as-you-enter cars on the Fourth and Madison Avenue line. He said that one object was the desire to reduce expenses, another was to assure better collection of fares, and a third was that it was believed the operation of such cars would be safer and afford greater convenience to the public than the old style of cars. Mr. Root said he had made a report to the company on the subject before the receivers were appointed; in order to prepare this report he had investigated the pay-as-you-enter situation at Montreal and reported verbally at a committee meeting when he returned.

Mr. Willcox referred to an article by Mr. Root published in the STREET RAILWAY JOURNAL of Oct. 5, 1901, in which the transfer system was discussed. Mr. Root stated in this article that the transfer system had increased the earning power of the Metropolitan company more than any other one cause. Mr. Root replied, although this seemed to be the case in 1901, subsequent investigation had showed that transfers had been a factor in the development of traffic, but not in net return to the company. He added that when he wrote the article the opinion he expressed was shared by men who knew much more about transportation than he did at the time. Mr. Root continued:

"Practically at the time that article was written the transfer system was not subject to grave abuse. I am not prepared to say to-day that a transfer system, properly regulated, of some character would necessarily be a burden which could not be carried by this system. I am not prepared to say one way or another. At the time that article was written the extent of the transfer system was small compared with what it is now; moreover, the great increase in the cost of operation was not a factor then as it is now. The result is that the margin of profit is less now, and while the transfer system seemed to be profitable then without the abuses that have grown up in its practice and without the great increase in the cost of operation, it would look very different to-day." Mr. Root said

that the article referred to the restricted transfer system in force in 1901 when it said that the liberal system of transfers adopted and in force in the eight or nine years preceding the writing of the article had increased the earning power of the company more than any one cause. When asked about the effect of a restricted transfer system to-day, Mr. Root said: "The restriction would have to be greater because the cost of operation is much more; it has gone up very materially. Another example: We are paying \$5,000 now for a car, when for the same car we formerly paid from \$2,600 to \$2,700. But making due allowance for the great increase in the cost of operation, I am not prepared to say that a properly regulated transfer system would not be perfectly logical and one under which the company could operate."

Mr. Willcox read a statement made by Mr. Root that the congestion was so great conductors were practically unable to follow the regulations as to transfers laid down by the company. After Mr. Willcox had concluded, Mr. Root said that the company had never waived the right to make restrictions, although, of course, it was found out later that the company did not have the right to make these restrictions, and all the abuses that made transfers so burdensome to the system had developed since that time. Mr. Root said that in discussing the transfer system at that time he was trying to show, when the evils were first beginning to crop up and prove disastrous, that the transfer system was fair as a general proposition and that he was merely trying to draw a comparison which would seem to show the system to be reasonable as compared with the system in force previously.

Continuing, in response to further questioning, Mr. Root said that at the time the statement was made "we considered that the transfer system as regulated, as we thought we had it regulated, was a good business proposition." Answering further inquiries, Mr. Root said he went to Chicago on the invitation of B. J. Arnold, who was making a report at that time for the city in relation to the transportation problem. He would say that his advice to Mr. Arnold was that a transfer system properly regulated and not subjected to abuse—if other conditions were of a character to warrant it, such as the amount of taxes, etc.—should produce revenue and be of advantage to the companies entering it. He thought that it was wise to give a continuous ride in one general direction for one fare if conditions under which the company is operating make possible a reasonable return, but he could not outline policies as to rates or transfers or state how far passengers are to be carried until he knew all other conditions under which the company must operate.

Mr. Willcox asked Mr. Root what elements combined to make him change his opinion and to state what reasons he had for changing his views from those expressed in the article. Mr. Root said the reasons, briefly stated, were as follows: "We did not take into account the greatly increased cost of operation that prevails at present; we did not take into account the depreciation of the property, and that there was not a sufficient margin above what it cost us to carry a passenger to make what we considered then a reasonable return on the capitalization at that time. The situation now has developed so that with the increase in the cost of labor and material, making a greatly increased cost of operation, and an increase in the burden of taxation, the return from passengers has decreased so that instead of having a fair margin of profit the company is confronted with a deficit."

When asked by Mr. Willcox what he meant by referring to the general increase in operating expenses, Mr. Root said that he spoke of various materials that enter into the construction of a railroad, such as copper and iron and other classes of material that make the operating expenses from 10 per cent to 15 per cent and 20 per cent higher now than in 1901.

Mr. Root was asked by Mr. Harkness to define what he meant by abuse of the transfer system. He said he meant the unlimited use of transfers as being an unfair obligation upon the companies in the present state of transportation. Mr. Root said further that the operation of the pay-as-you-enter cars had not entirely eliminated the loss of fares by the company, although they were an improvement over the old system.

Mr. Root was asked why conditions in New York would not allow the use of a box into which the passenger would drop his 5-cent piece instead of handing it to the conductor, and he replied that the reason was that the only box used is one which retains the change. He said that as a result of actual test it was found that each conductor would have to be equipped with about \$50 change a day in order to carry out that system, and it would mean that the company would have to advance about \$150,000 to conductors each day. He said that the total gross fares on the Metropolitan system in 1906 and 1907 were at the rate of about \$15,000,000 per annum, and that the company had never bonded any of its employees. Mr. Root said that it would be impracticable to place \$150,000 in the hands of the men. He said that the company might be able to make an improved box within a reasonable time, and if not it would have to introduce a box used in other places. He said he had started an investigation with manufacturers who constructed boxes of this character. He had discussed the subject with the National Register Company and other manufacturers, and hoped that he could devise a box soon that would meet the present objections.

Answering other inquiries, Mr. Root said that estimates as to the extent of lost fares varied from 3 per cent to as high as 12 per cent of the gross revenue. Mr. Harkness called attention to a statement compiled by H. W. Brown, auditor for the receivers, showing that from passengers whose fares were received on Fifty-ninth Street during the year ended June 30, 1908, there were taken 2,922,540 fares, and from passengers who held transfers across Fifty-ninth Street 10,230,407 transfers were taken, making a total of 13,152,947 passengers.

Mr. Root said that the operation of the crosstown line was not profitable, in his opinion, under the conditions that existed before the lease was abrogated. In responding to other questions, Mr. Root said that with the railways the short-haul compensated for the long-haul and the companies had to average on the whole.

The hearing was continued on Sept. 24, when Mr. Root testified that the Metropolitan Street Railway Company was using the tracks of the Central Park Company for operating cars to and from one of the car houses, but the cars were not carrying passengers.

H. W. Brown, auditor of the company, was then asked about the amount which the receivers of the Metropolitan Company had paid for the use of the tracks of the Central Park Company on Fifty-ninth Street for its Sixth Avenue and other lines. Mr. Brown explained that these cars were not now routed via Fifty-ninth Street and that no rental had been paid for the tracks while they were, and he did not think any should be credited. He explained his position

by saying that it was not necessary for the receivers to use the tracks, as they had other routes which could have been and are now being used. The question also arose about the proper basis for the division of operating expense accounts between different properties operated under one management. Mr. Brown thought that some of the expenses should be divided on a car-mile basis, others on a ton-mile basis, while still others, such as damages and rent of lands and buildings, should be kept by routes.

RECOMMENDATIONS ON PHYSICAL EQUIPMENT IN NEW YORK

The 1907 report of the Public Service Commission, Second District, New York, just issued from the office of the Commission in Albany, contains the results of the inspections of different roads made by the expert of the commission and his recommendations. To indicate the policy of the commission, the following excerpts are taken from the changes suggested on different roads. As a rule but one recommendation is taken from each road.

(Suburban road)—That [a certain] trestle shall be reconstructed. Until this is done no train or car shall run over this trestle in less than four minutes. That the company place a watchman's clock at one end of the trestle, so arranged that by a motorman pushing a button at either end of the trestle, a record will be made by the clock of the time consumed in its passage between these points, this clock and necessary connections to be installed in one week from the acknowledged receipt of this report. That after Jan. 1, 1908, no train consisting of two or more cars, drawn by one motor car, be operated on this company's system, unless each car in such train is equipped with some form of power brake so constructed and arranged that the motorman can control the brakes on all the cars of the train.

(Interurban road)—That the company remove from its main line track all of the 6-in. face ties which were put in in the original construction of the road; these to be replaced by standard oak, yellow pine, or cedar ties, oak or yellow pine only to be used on all curves. All curves to be so equipped by May 1, 1908. All the remaining 6-in. face ties to be replaced by Sept. 1, 1908. That the company construct an additional telephone line along the whole line of its railroad, to be used for train dispatching only.

(High-speed interurban road)—That the company equip all the curves on its railroad of 2 deg. or over with standard oak or yellow pine ties and with rail braces. That all switches be equipped with switch stands and targets, and that the names of switches be displayed on a sign reading in each direction, and that the lights be kept burning over such signs at all hours of darkness when trains are operated. That all passenger cars operated on this road be equipped with wrecking tools. This order to be complied with within 60 days from its acknowledged receipt. That all cars operated on this road be equipped with toilets. This order to be complied with not later than May 1, 1908. That the high-tension transmission line be removed from public highways.

(Suburban road)—That all cars operated on this line be equipped with air brakes. That all curves be equipped with rail braces.

(City road)—That after May 1, 1908, no cars shall be operated on this line unless equipped with air brakes.

(Short suburban road)—That the freight motor be equipped with air brakes, and that all foreign cars drawn by it which are equipped with air brakes be coupled so that the motorman can control the brakes on all the cars in the train. This order to be complied with within 60 days from the acknowledged receipt.

(Interurban road)—Derails should be placed on all switches which have grades descending to the main line track, and on which cars are at times stored. That the company equip all of its grade crossings of steam tracks with metal troughs on the trolley wire. That all its sub-

urban cars be equipped with wrecking tools and fire extinguishers. That the company equip all highway crossings on its suburban divisions with crossing signs.

(Short interurban road)—That it equip its line with telephone facilities necessary for a proper train dispatching system; that such system, to be approved by this commission, be installed not later than May 1, 1908.

(Interurban road)—That the company improve its methods of train dispatching by supplying motormen and conductors with proper blanks for receiving train orders, which should be received and written by one member of the crew, who should give a copy to the other member, who should then repeat it back to the train dispatcher, receiving his O.K. in the usual and proper manner. That the double-truck freight car operated on the suburban line should be equipped with air brakes. That all curves of over 3 per cent on the interurban line should be braced.

(Short interurban road)—That the company should equip its suburban line with a telephone system, with telephones at all turnouts; that it should equip all the turnouts on its line with signs showing the names or numbers of switches, with a black letter on a white background, reading in both directions, a cluster of lights to be suspended over such signs and to be burned during hours of darkness while cars are in movement.

(Suburban road)—That the company provide a suitable waiting room at the end of its line for its passengers. That it erect clusters of lights, suspended at points where the track crosses the highway, and that these lights be kept burning during hours of darkness. That special precautions be taken to keep the track clear of leaves during the fall season of the year on all portions of its system, especially on [certain] steep grades. That all cars operated on such roads be inspected, especially as to brakes and sand boxes, on each round trip.

(Interurban road)—That during the summer season, when double headers are run, all cars immediately followed by another shall, during hours of darkness, be equipped with oil tail-lights on the rear end of the car.

(City road)—All cars operated on [certain steep] grades should be equipped with sand boxes, which should be maintained in proper condition and at all times while in movement filled with sand.

(Suburban road)—That all cars operated during the hours of darkness be equipped with oil tail-lights.

(Short interurban road)—That the company prepare a proper running schedule, showing run numbers, termini, meeting and intermediate points; that it prepare a proper set of rules, in book form, to be furnished the employees; that it install a proper system of train dispatching; that all cars operated as regular cars carry run numbers; cars followed by another to carry "car following" signs, properly illuminated at night; that telephones or telephone connections be placed at all switches; that register books be placed at each terminus and at a specified intermediate station, and all crews on this line register arrival and departure at these points, no crews to leave a register station without a clearance card. That the company equip all of its closed cars operated on this line with wrecking tools. That all of the above orders be complied with not later than May 1, 1908.

(Suburban road)—That the company place metal troughs on trolley wires over two grade crossings with steam tracks.

(Short interurban road)—That the company put in operation a proper method of issuing train orders, including proper blanks for the use of train despatchers and train crews; that the rules be amended to include: requiring all cars followed by another one to carry signals indicating car following; requiring run numbers to be displayed on all regular cars, and a sign on extra cars to be displayed, indicating that they are extra.

The Toronto (Ont.) Railway on some of its lines has adopted a system of stopping the cars in the middle of a block in order to collect fares. This is being done in order to put a stop to the practice of people getting on the cars, riding for a short distance and getting off before the conductor has time to collect the fares.

ORNAMENTAL TREATMENT OF BERLIN SUBWAY ENTRANCES

The Germans are so proud of Berlin that even objects of great utility used in that city must assume an artistic exterior. The Berlin elevated railway has long been a

station with its fence of simple metal squares gives a particularly pleasing effect of stability. Two of the portals also show the parkway gardens adjoining the back of the stairways. All of them are illuminated by groups of incandescent lamps with outer globes arranged to illuminate the stairway and the word "Untergrundbahn" (under-



Berlin Subway Stations—Sophie-Charlotte Square, Reichskantzler Square and Bismarck Street

notable example of this tendency in the construction of the roadway proper; the stations; and the wide variety of portals, each of which must conform to the architecture of the adjoining buildings. That the new Berlin subway to Westend has also been made to add to the beauties of the capital will be apparent from the accompanying illustrations showing the artistic iron and stone work at five station entrances.

The arched portal and fence at Bismarck Street are

ground railway). The stations themselves are also treated in a highly artistic manner, the walls being faced with colored tile and the columns made in various forms.

The West End extension of the Berlin subway, on which these stations are located, extends to Charlottenburg, which is one of the handsomest residential and suburban districts of the German capital. This extension connects with the main line of the Berlin elevated-subway system on which construction was commenced in 1896 by the Siemens-Halske



Berlin Subway Stations—Entrance at Wilhelm Square

made of metal throughout. The stations at Sophie-Charlotte Square and the Kaiserdamm railroad depot are also of metal throughout, but the designs differ, especially in the substitution of various pagoda effects for the arch. On the stations at Wilhelm Square and Reichskantzler Square stone has been employed quite freely and the latter



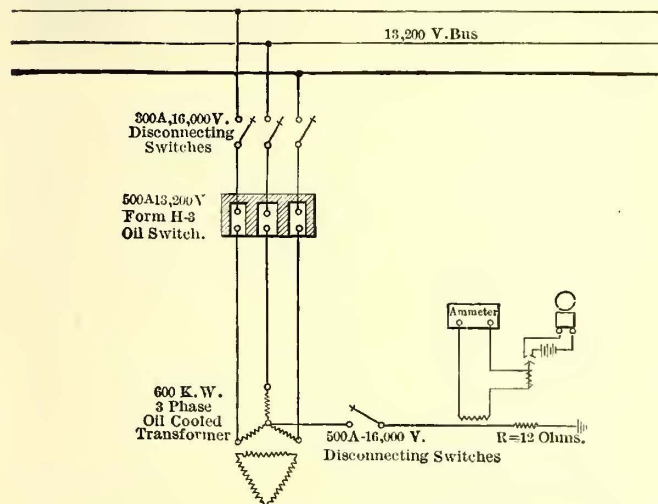
Berlin Subway Stations—Kaiserdamm

Company. The third-rail system of direct-current operation at 800 volts is used.

The "pay-within" cars of the Philadelphia Rapid Transit Company, described in the Sept. 19 issue, began successful operation Sept. 27.

GROUNDING A TRANSMISSION SYSTEM THROUGH A SPECIAL TRANSFORMER

Current for the operation of the Twin City Rapid Transit Company's lines is generated at a large steam station and two water-power stations. The machines in the older one of the water-power stations generate current at 3500 volts, while the steam station and the new water-power station feed the transmission system at the generating pressure of 13,200 volts. The step-up transformers in the old water-power station which raise the voltage from 3500 to the generating and transmitting pressure of the other stations, are delta-connected on both secondary and primary. During the part of the day when the lightest load occurs this station has ample capacity to furnish current for the entire railway system, and therefore the steam station may be shut down. Since the transformers in the old water-power station are delta-connected, it has not been possible until recently to have ground connection on the transmission system while this station is carrying the whole load. To furnish a permanent ground for the entire high-tension system a large transformer with its primary coils star-connected and its neutral grounded through resistance has been installed in the steam generating station. The transmission



Connections for Special Transformer for Furnishing a Ground to the Twin City Transmission System

cables to the substations all radiate from the bus compartments of this station and by means of the grounded neutral of this transformer there is a ground connection for the transmission system, no matter which of the generating plants may be in service.

The accompanying sketch shows the arrangement of the grounding transformer and its connection with the main high-tension bus of the distributing station. The transformer is of the standard self-cooling type of 600-kw capacity, with the primary coil star-connected and wound for 13,200 volts and the secondary coil delta-connected and wound for 440 volts. The secondary coil is permanently connected in delta with no exterior taps. Were this secondary to be opened the transformer would act only as impedance in the three-phase circuit. The frequency is 35 cycles.

The primary leads of the transformer are connected with the main high-tension buses of the power station through a form H-3 oil switch provided with hand-operated disconnected switches. The oil switch is provided with operating contacts on the switchboard, but no automatic relay is connected in the control circuit. The midpoint of the star-wound primary is connected to ground through a

disconnecting switch and a cast-grid resistance of 12 ohms. This amount of resistance restricts the current flowing to ground to a maximum of about 600 amp when there is a good ground on any other point in the high-tension system. A current transformer is interposed in the ground lead between the disconnecting switch and the resistance. This current transformer operates the coil of a relay, which is so adjusted that when current to the amount of 40 amp passes through the ground connection the plunger of the relay completes a bell circuit, thus giving an alarm. The relay adjustment is such that when the bough of a tree switches across the transmission line during a storm, or a bird gets in contact with the two sides of the horn arrester, the bell immediately rings. Double ground connections were made by sinking a plate below the water level of the river nearby and by making connection to the negative return cables of the railway system.

The installation of this large transformer for the purpose of grounding the neutral of the three-phase transmission system has been successful. Previous to the time when this transformer was put into service surges occurred on the transmission system, which resulted in troubles to the cable insulation being communicated from one point of the transmission network to widely varying points. Ordinarily such troubles originate because of a ground rather than a short circuit, and now, when such a ground occurs, the alarm bell operated from the ground connection of the transformer immediately notifies the switchboard attendant that there is trouble on some feeder line. He at once glances along the line of ammeters and can tell by the swinging of the needles which feeder is disturbed. The oil switch between this feeder and the main bus immediately is opened and thus the trouble is not communicated to the substations; and so far the operators have been able to open feeder lines on which the cables were grounded before the burning at the ground has become disastrous.

Practically the entire load on the transmission system consists of rotary converters, so the phases are balanced. All feeder lines leaving the power station have current transformers on each leg, so that no matter what phases become grounded the entire feeder is automatically cut out. The grounding transformer supplements this system of automatic overload relays and with the assistance of the switchboard operator defective cables are cut out before the short circuit or ground draws enough current to operate the automatic relays. It is stated that since this transformer installation has been in service there has not been a single case of "simultaneous" cable troubles.

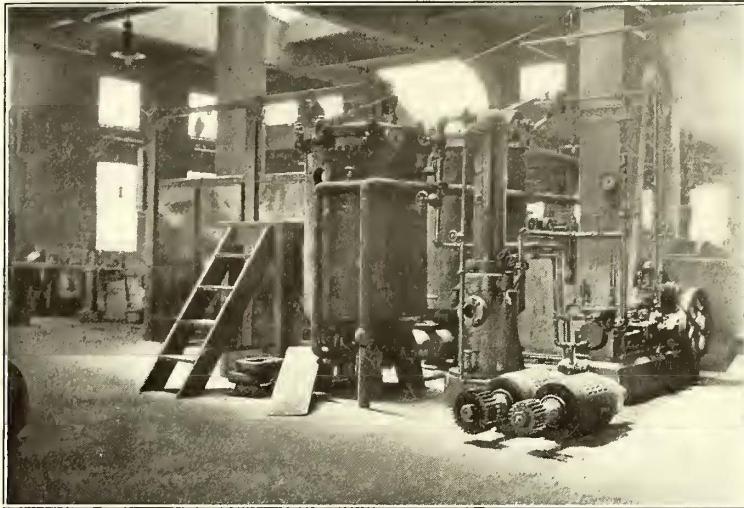
PROPOSED EXTENSIONS IN MONACO

Important extensions are proposed to the electric tramway system in Monaco, which has recently been taken over by the Nice-Littoral Tramway Company. Through connections have already been made between Nice and Mentone, by way of Monte Carlo, and the line will be extended to the Italian frontier, constituting one of the longest interurban lines in Europe. Further extensions are proposed in Italy by an Italian company, which eventually, it is reported, will connect Nice with Turin. It is already possible to travel by trolley a distance of about 50 miles, and nearly all of the way close to the seashore, through a scenery which has made the Riviera famous. Express trains are being run on part of the system, and there are branch lines to different points.

SPECIAL SHOP TOOLS OF THE TWIN CITY RAPID TRANSIT COMPANY

In the shops of the Twin City Rapid Transit Company, Minneapolis, Minn., a number of special tools have recently been built which assist materially in lowering the cost and bettering the quality of manufactured parts and repair work. Among them are a babbitt saw, commutator

terior of the old shells is mounted on the cast-iron table surrounding the melting pot. This melting device comprises a cast-iron holder in which can be placed two journal brasses, so that the flame from a gas burner may be directed against the interior of either journal brass. In practice, as the flame is not turned directly into one of the shells from which the old babbitt is being removed, the shell standing nearby receives enough of the waste heat so



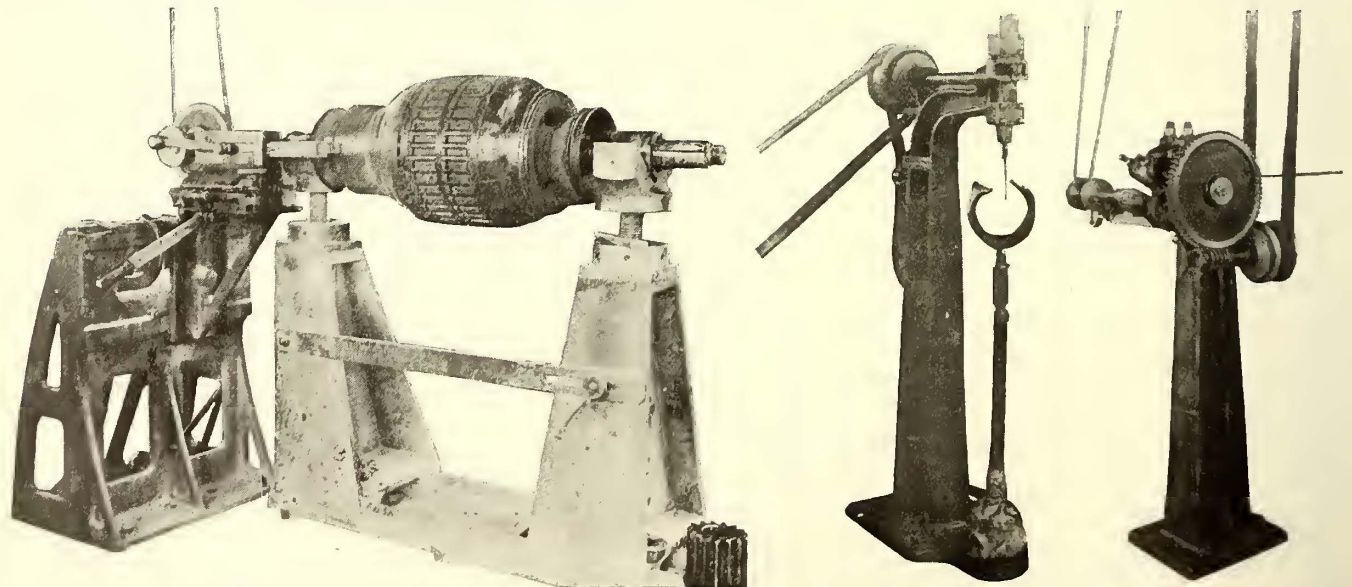
Twin City Shops—Vacuum Impregnating Plant and Babbitt Outfit with Air-Operated Mandrel

segment bender and cutter, commutator grooving machine and a journal babbitting plant, comprising a special arrangement of melting pot and a pneumatically operated casting mandrel.

It is the practice in the Twin City shops to maintain armature shafts to one of three standard diameters which vary in 1/16-in. sizes. When a shaft is worn down to the smallest size a bushing is shrunk on and turned down to the largest standard size. All armature bearings are babbitted

that by the time the babbitt has been melted out of the first shell, the second one is heated nearly to the melting point. As the babbitt melts and leaves the interior of the shells it runs through grooves in the bottom of the cast-iron holder and falls into the large melting pot. In this way the worn-out bearings are freed of babbitt and all the babbitt is returned directly to the heating pot without first having cooled and lost its heat.

Probably the most interesting part of the babbitting



Twin City Shops—Commutator Slotter, Babbitt Saw and Commutator Segment Machine

and bored to fit axles of one of the three standard sizes. The accompanying illustration shows the specially designed babbitting outfit which has recently been installed. The plant comprises a melting pot and attachments and a pneumatically operated casting mandrel. A cast-iron work table surrounds the top of the melting pot. Heat is furnished by an American gas furnace.

A special arrangement for melting babbitt from the in-

outfit is the pneumatically operated casting mandrel, shown in the same illustration. This device is arranged to furnish a core around which the bearing shell may be babbitted. The core is attached to an air piston enclosed in a cylindrical iron casting. After a bearing shell has been babbitted about this core air pressure is turned on and the core is mechanically withdrawn into the large cylinder, leaving the bearing ready for removal and finishing. The

piston arrangement of the air cylinder is such that when the air pressure is first turned on for the removal of the mandrel a hammer blow is automatically given the piston rod, thus serving to loosen the core from the babbitt. The large body of iron in the core serves to cool the babbitt quickly which, combined with the mechanical removal of the mandrel, enables the babbitting work to proceed rapidly.

The insides of the bearings are finished in a boring mill provided with a special boring bar. This bar carries cutting tools which remove the surplus metal. These cutting tools are followed by seven rollers supported on the same bar. Thus in one operation the interior of the bearing is bored and given a smooth rolled surface.

The bearings are cast with plugs placed in the oil wells, but these plugs do not extend through the babbitt. In finishing the oil wells a hole is first drilled through the babbitt and then the remainder of the babbitt is cut out with a special babbitt saw. This saw is also illustrated and was designed and built in the Twin City shops. The saw blade is about 6 in. long and $1/16$ in. thick held vertically in a chuck. The machine is belt-driven and a cross-head serves to give the connecting rod supporting the saw chuck an up-and-down motion. The saw is operated at about 350 strokes per minute. A foot treadle is provided so that the operator may throw the driving mechanism in and out of gear while he is handling the work. The bearings are not rigidly fastened beneath the saw, but are held in an adjustable split rest which is mounted on a swivel post. This method of finishing the oil-well bearings by sawing away the babbitt at the sides is said to afford a smooth interior to the bearing without any danger of loosening the babbitt from the brass.

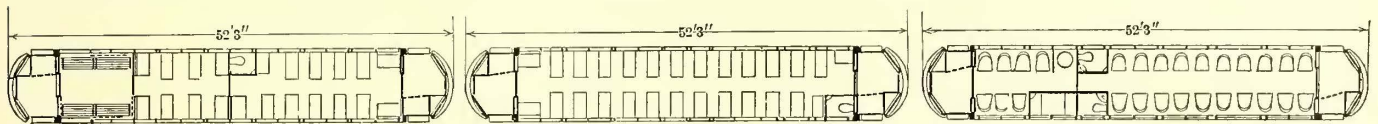
A very useful machine for bending and cutting commutator segments has recently been built in these shops and installed in the electrical department. An illustration of this machine is presented. Copper bar of the proper cross-section when fed into this machine is bent to any desired radius and cut into commutator segments of any desired length. The bar in entering the machine passes one fixed roll and two adjustable rolls. The fixed roll is operated by a worm-gear belt driven through a friction clutch. By means of adjusting screws on two of the rolls the radius

of any size. The saw is operated by a connecting rod and an eccentric connecting with a belt-driven pulley. By means of adjusting screws beneath the blades which support the armature journals, the commutator may be adjusted very accurately to the proper height, and likewise, the saw is adjustable in both vertical and horizontal planes so that it may be made to cut away only the mica between the segments. This slotter is operated by a boy and can slot a commutator in about 60 minutes.

In its electrical shops the Twin City company has a very complete installation of vacuum impregnation machinery of the J. P. Devine type. One of the illustrations shows this vacuum-impregnating plant and the front of the bake oven built in connection with the plant. The apparatus in this installation comprises a liquor and a vacuum tank, a condenser and a combined air-pressure and vacuum pump. This installation differs from some others in that the mixer in the liquor tank is operated by belts driven from the pump fly wheel. A solid compound is used for insulating field coils, the method following in general the customary practice for this work. Experiments are now being conducted to determine the efficiency of a number of other compounds. After impregnation the coils are dried in the nearby bake ovens. These ovens are built directly on the gallery floor which supports the impregnating plant. The walls of the ovens are built of hollow tile surfaced on the outside with concrete. The interior of the ovens is divided into two chambers so that if there is only a small number of coils to be dried steam need be used for heating but one chamber. Each chamber is provided with ventilating holes in the top and the sheet-steel doors forming the fronts of the chambers have counterweights.

THREE-CAR TRAINS FOR THE CHICAGO & MILWAUKEE

It is expected that the Milwaukee extension of the Chicago & Milwaukee Electric Railroad will be completed by the middle of October. Then the company will inaugurate a limited train service between Evanston, Ill., and Milwaukee, 73 miles. The company will have a high-speed, double-track route throughout the entire length of the road, and it is planned that limited trains will make the run in three



Chicago & Milwaukee Railroad—Three-Car Train

of the finished segment can easily be changed. After the copper bar has been rolled through for the length of one segment, it is cut off with a circular saw held in a horizontal position and operated by two round leather belts. The saw blade is 4 in. in diameter by 0.032 in. thick and runs at about 2000 r.p.m. It is fed against the copper bar by hand. With this machine commutating segments are bent to the correct radius and cut off to the proper length, so that they require no finishing except drilling. The operation of the machine is so simple that it can be tended by a boy and thus the segments are manufactured at a low cost.

Another illustration shows a commutator slotter which has been built in the Twin City shops. This slotter comprises two parts—the standards in which the armature is supported and adjusted to the correct height and angle and the slotter mechanism with its table which moves along a cast bed. With this machine the slots are cut by a hacksaw blade, which is so supported that it can be adjusted for cutting out the mica from between the segments of a

hours' schedule time, including layovers. This schedule later will be reduced. These limited trains will be made up of three coaches, coupled, as shown in the accompanying engraving. The Jewett Car Company is now building nine cars, which will be put into this limited service.

Reference to the illustration will show the detail arrangement of the train and the overall dimensions of the cars. The head car will be divided into three compartments, including a baggage room at the front, a smoking room and a main compartment. The middle car will be undivided and will be wholly for passengers. The rear car will be a combination parlor and buffet car. In the front end, which will be used as a smoking room, will be a small buffet kitchen on one side and the hot-water heater on the other. Two toilet rooms will be provided at the center of the car, and the rear end will have 20 chairs.

Each car will have four GE-73 motors mounted on Baldwin trucks. Type M control, Westinghouse automatic air brakes and Van Dorn couplers.

BRIDGE RECONSTRUCTION ON COLUMBUS & LAKE MICHIGAN RAILWAY

BY DANIEL B. LUTEN, PRESIDENT NATIONAL BRIDGE COMPANY, INDIANAPOLIS.

The Columbus & Lake Michigan Railway, extending from Lima to Defiance, Ohio, was formerly operated as a steam road. In March, 1906, it was acquired by the Indiana, Columbus & Eastern Traction Company and later transferred to the Ohio Electric Railway Company, by whom it has

the arches, while maintaining traffic. The structures replaced consisted of wooden trestles with pile bents, spaced about 16 ft., and in the case of the bridge shown in Fig. 1, of a combination Howe truss bridge, which may be seen in Fig. 2. The arches were in each case built around the pile supports, the concrete being kept clear of the piling by boxing to prevent vibration. After completion of the arches the track was blocked up on the crown and haunches and the piling cut out, then the holes plugged with concrete and the earth filling put in place over the arches, after which

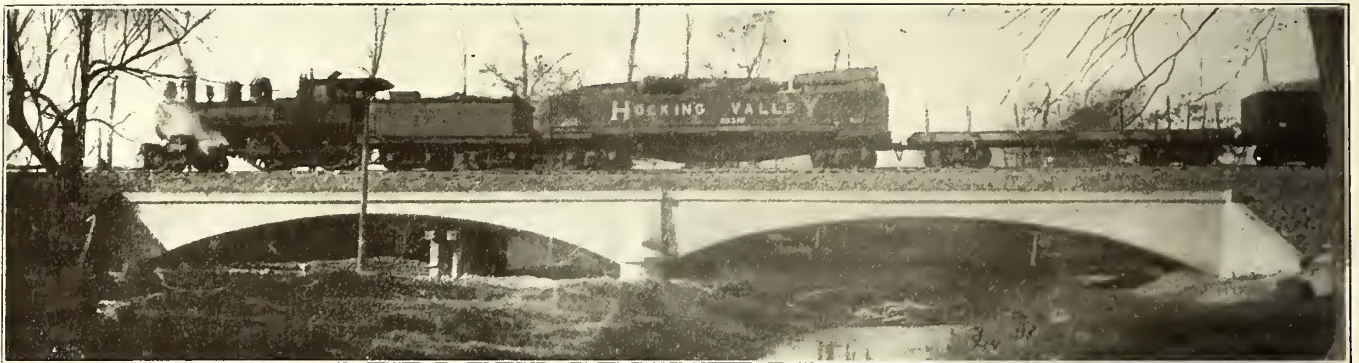


Fig. 1.—Bridge Reconstruction on Columbus & Lake Michigan Railway—Two-Arch Bridge Located at Station 816 from Lima, Ohio

been greatly improved in roadbed, track and bridges, with the intention of modifying the service to electric traction for passengers while maintaining steam service for freight traffic.

The line is 48 miles in length and includes 14 bridges. It was early determined to rebuild the bridges in as permanent a manner as possible without excessive cost. In March, 1907, a contract was awarded to the National Bridge Company for 13 bridges to be built with reinforced concrete arches. The arches were designed by the National Bridge

the centers were removed, usually at 20 to 30 days after completion of concreting.

The arches are of the type shown in Fig. 3, reinforced with a single series of steel rods following the inner surface of the arch closely near the crown and crossing to the outer surface at the haunches, the points of crossing for alternate rods occurring at one-third, one-half and two-thirds of the distance from crown to springing. Transverse reinforcement bonds the arch rings to the spandrel walls. The arches are flood-proofed by concrete paving in the bed of the stream, in which are imbedded steel ties from

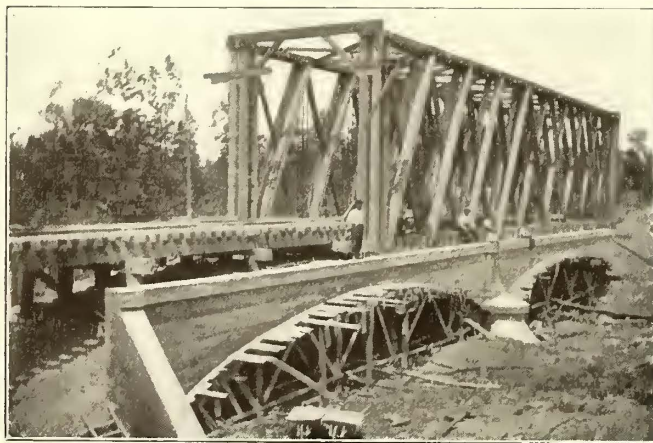


Fig. 2.—Bridge Reconstruction on Columbus & Lake Michigan Railway—Old Howe Truss Bridge in Use Before Completion of Two-Arch Bridge Shown in Figs. 1 and 3

Company by the empirical method, described in *Engineering News* of June 28, 1906, and were guaranteed "safe and sound and free from defects of design, workmanship or materials" for five years from date of completion, the guarantee being secured for one year by a surety company bond equal to the contract.

Three of the bridges, typical of all the others, are illustrated in the accompanying views and sections, together with various steps in the progress of construction showing the methods of replacing the pile trestles and trusses, with

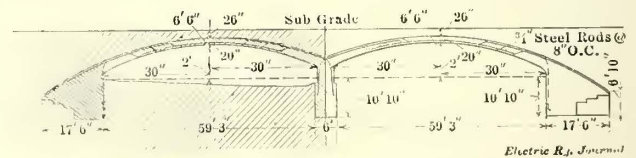


Fig. 3.—Bridge Reconstruction on Columbus & Lake Michigan Railway—Cross-section of Bridge 816.

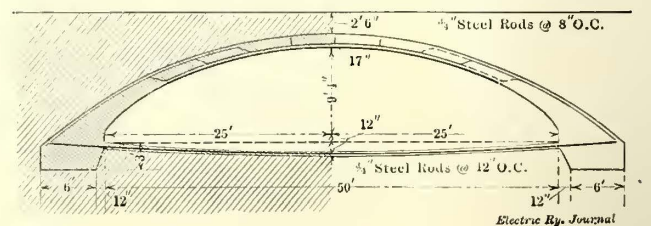


Fig. 4.—Bridge Reconstruction on Columbus & Lake Michigan Railway—Cross-section of Bridge 943.

abutment to abutment to take the thrust of the arch. The arches were designed for 100-ton cars or two trucks spaced 25 ft., or, what is practically equivalent, Cooper's E. 50 specification.

The bridge shown in Figs. 1 and 2 consists of two 60-ft. spans, with a rise of 6 ft. 6 in. from springing of pier to crown. No flood-proofing pavement was employed, for the reason that rock foundations were found at 8 ft. below ground level and the piers and abutments were carried to rock as being more economical than the use of the pave-

ment ties. The abutments were stepped up at the back to save material, a sufficient backing being provided against the thrust by the blue clay that covered the layer of rock.

The heavy lower chords of the wooden truss bridge necessitated a considerable space between top of arch and base of rail, so that the arches are covered with over 2 ft. of earth fill in addition to the ballast, whereas ordinarily 12 in. would be more than sufficient cushion for railroad loading. The springings at the pier were elevated 2 ft. above those at the abutments in order to provide maximum waterway without excessive concrete in abutments.

The centers were supported on wooden sills, and uprights were arranged as T-columns, which were permitted to buckle by resolving the T into its two elements when centers were struck, thus avoiding the use of wedges or sand-boxes. The arches were concreted in continuous rings complete from springing to springing of one arch, abutments and piers having first been concreted to the springings with a skewback to receive the thrust of the arch. Wings were concreted continuously with the spandrels, but an expansion joint was provided in each spandrel at the pier vertically above the springings.

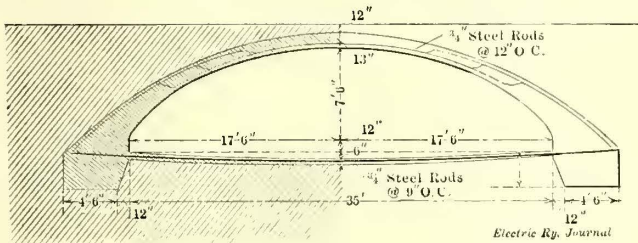


Fig. 6.—Bridge Reconstruction on the Columbus & Lake Michigan Railway—Cross-section of Bridge 401

The wings are reinforced diagonally from spandrel to base near the front face, on the principle that the wing is supported against lateral movement at spandrel and also along its base and that it should be reinforced as a beam against the earth pressure behind it, considering the base and spandrel as the supports.



Fig. 7.—Bridge Reconstruction on Columbus & Lake Michigan Railway—Bridge 401, 35-ft. Span on a 30-deg. Skew

This bridge carries a single-track roadway 16 ft. wide at subgrade and contains 625 yd. of concrete and 13,600 lb. of smooth steel reinforcement. The reinforcement constitutes but 4 per cent of the cost of the bridge. The bridge is

located at station 816 from Lima, over Sugar Creek, near Kalida.

A 50-ft. span is located in Kalida at station 943 and is shown in Figs. 4 and 5. The construction is similar to that of Bridge 816, except that the flood-proofing pavement was employed with tie rods to reduce the abutments.



Fig. 5.—Bridge Reconstruction on the Columbus & Lake Michigan Railway—Bridge 943 of 50-ft. Span

Bridge 401 at Gomer, a 35-ft. span on a 30-degree skew, is shown in Figs. 6 and 7. The section parallel to track on a skew arch is designed the same as for a right arch, on the supposition that skewing the bridge tends to strengthen it rather than weaken it, by reason of the distortion of the arch barrel. Such reasoning would not apply at all to a stone or brick arch, and skew arches of the latter material are excessively expensive or heavy by reason of the peculiar arrangement of courses necessary to resist the forces.

This adaptability of concrete for skew arches is only one of the many advantages that skew bridges of concrete have over nearly every other type of skew bridge. With structural advantages over block arches on the one hand, they also have roadbed advantages over every type of bridge that is built with ties supported on stringers or floor beams. A skew bridge, in which one end of a tie rests on the solid ballasted roadbed while the other end is supported by a girder, does not permit of satisfactory maintenance of grade of approaches. So great is the difficulty of building and maintaining trusses and girders without solid roadbed, on skew, that such bridges are usually built square with the track, in which case the span provided must exceed that for a skew bridge by the amount of the skew, with consequent waste of material and increase of cost. The skew bridge of concrete not only presents a satisfactory roadbed surface but also provides a waterway channel with smooth sides in line with the stream, offering the least possible obstacle to flow of water or debris.

All of the 13 bridges on the Columbus & Lake Michigan Railway were completed and opened to traffic within six months after award of contract.

THE INDIANA UNION ELECTRIC FREIGHT LOCOMOTIVE

The electric freight locomotive built by the Indiana Union Traction Company, and described on page 637 of the Sept. 12 issue, is giving such satisfaction to the officials of the company that they are quoted as saying that it will be used for hauling regular freight trains over the system in a short time. At present it is employed only for hauling coal and other freight cars about the power houses and shop of the company. The locomotive weighs 50 tons and is rated at 800 hp, giving it sufficient power to haul 20 to 40 loaded standard freight cars. The principal objection to its wider use would be the need of strengthening bridges.

DEPRECIATION IN STEAM RAILWAY ACCOUNTING

The members of the American Railway Association have received a memorandum containing a summary of the views expressed by various railway officials on the subject of depreciation, compiled by the special committee on relations with Interstate Commerce Commission of the association. This committee is composed of the following: F. A. Delano (chairman), president, Wabash Railroad; W. C. Brown, senior vice-president, New York Central lines; Jno. P. Green, first vice-president, Pennsylvania Railroad; Daniel Willard, second vice-president, Chicago, Burlington & Quincy Railroad; Robert Mather, president, Rock Island Company. The memorandum is as follows:

First.—To attempt to fix the rate of depreciation in percentages of original value is at best nothing more than "estimating" or "guessing;" it is not "accounting": (a) Because no two roads are alike; (b) because no two years are alike—on account of difference in character of equipment owned, difference in character of service and difference in volume of service.

Second.—At the hearing before the Interstate Commerce Commission, on May 22, 1908, the statistician of the commission said: "It is not alone the purpose of depreciation charges to protect the investor; the correct determination of net operating revenue per month and per year is equally important, and from the public point of view of relatively more importance." If the theoretical accrual of liabilities for depreciation proves to be different from the facts (as it necessarily will be in every case) it will be necessary later to make adjustment debits and credits to expenses, and probably some very large ones, in order that "net operating revenue" may not be incorrectly stated. Even then the current statements "per month and per year" will inevitably be more or less out of joint.

Third.—If the refinements of accounting which are now sought are to be accomplished, the transportation companies will be compelled to add a force of bookkeepers to each workshop, and then the shop expense will include not only labor for repair and renewals of equipment, but this additional expense which would benefit neither the carrier nor the public.

Fourth.—In establishing depreciation percentages, what allowance should be made from time to time for the use or non-use of equipment?

Fifth.—In the matter of obsolescence, who is competent to predict what types will be considered desirable or efficient 10, 20 or 30 years from now, and therefore, what retirements will be expedient on different roads?

Sixth.—If the commission is now justified in establishing an arbitrary depreciation charge on equipment, it will logically be followed by depreciation charges on bridges, buildings, rails, ties, fences, telegraph line, block signals and structures of all kinds. This means more estimating and more subsequent readjusting, and also more unnecessary expense.

Seventh.—Railway executives take the position that property accounts should be as sacred as income accounts. They concede that the commission is right in endeavoring to show all liabilities; but they contend that to anticipate liabilities by setting up reserves, while it may display a well-meant prudence, actually involves a misstatement of facts, and is, therefore, not good "accounting."

It is suggested, with a good deal of force, that it is the duty of the board of directors of each railway company to determine from time to time, according to the facts as they exist, when and to what extent charges should be made against income on account of depreciation which has actually occurred, and also to determine the proper means of providing for meeting these charges, either out of the company's surplus, or otherwise. Has the act to regulate commerce taken from these boards of directors any of their authority in these respects, or relieved them of any of their responsibilities? In other words, has the commission a legal right to compel railways to make charges in order to create reserve accounts against liabilities which it is estimated will occur?

Eighth.—The theory upon which a monthly charge for

depreciation is proper is that it is a liability which has been incurred, and should, therefore, be stated; howbeit, it is admitted that this liability cannot be definitely determined and must be estimated in advance from experience tables. If it is the duty of railway officers to state all estimated liabilities, then by the same token many other estimated liabilities must be included in the accounts. For example, whenever there is a personal injury, or any accident of any kind, causing loss of life, or damage to property, an estimate of the probable cost of making settlements should be included; in the same way, an estimate of the cost of settling outstanding lawsuits should be included.

Ninth.—The idea of creating "reserve" or "suspense" accounts, to take care of estimated liabilities, is not a new one. It has been tried by steam railroads, as well as by many other corporations. For instance, the experiment has been tried of creating suspense accounts, against which rails, ties, ballast, car and locomotive repairs and replacements, and other large items of maintenance or operation, were ultimately charged. But it is the consensus of opinion among the best accountants that such methods result in misleading, rather than truthful returns. If, as it is assumed, correct accounting should show actual expenditures, actual outlays, actual liabilities as they are determined, then the method of charging for expenditures, which have not in reality been made, is not only objectionable, however well meant, but it causes a false return instead of a statement of actual facts.

Tenth.—This is a practical question as well as a theoretical question, because financial problems with railroads are as practical as the movement of trains. It is not only wrong from an accounting standpoint, but as wrong morally to understate income as it is to overstate it. Again, at a time when the credit of railroads is at a low ebb, any diminution of net revenue reflected in their exhibits immediately become a very practical question on account of a consequent further lowering effect upon the company's credit and the consequent impairment of its ability as a semi-public servant.

Eleventh.—It must not be understood that railway executive officers are opposed to making charges against operating expenses to make good losses due to depreciation. While it is contended that with buildings, structures or equipment properly maintained, there is no depreciation except that due to obsolescence, still it is desirable to make good the losses due to obsolescence. The points upon which the views of railway officials differ from the views expressed by the statistician for the Interstate Commerce Commission, are simply these:

(a) That depreciation due to obsolescence cannot be accurately determined in advance, and hence any liability resulting from such obsolescence may be "guessed at," but cannot be accurately gaged in advance.

(b) The value of the assets of any company of every name and nature varies from time to time according to business conditions, and it is the duty of the board of directors, acting for the stockholders, to determine how any loss in the value of assets shall be made up.

(c) In considering any shrinkage in the value of assets, full consideration must also be given to any appreciation in their value. There is usually some appreciation in the value of right of way, terminals, land, town lots, roadbed, and in the value of switch connections, business affiliations, etc.

(d) The practice which seems best justified by experience is to make good losses from depreciation of this kind out of earnings in years of plenty, not only by the full restoration of the physical property by ample maintenance expenditures, but also by the replacement of obsolete structures or equipment with more modern or more efficient structures or equipment.

(e) The executive officers of railroads assume that the commission desires in the accounts a full, accurate and complete statement of facts for the benefit of public interest, as well as for the protection of investors.

Twelfth.—There has been no better argument on the whole subject than that contained in the paper of Oct. 7, 1907 [by William Mahl, comptroller Union Pacific Railroad], from which the following paragraph is quoted: "Appreciating, therefore, all the difficulties and cost which the keeping of the equipment accounts as contemplated by

the commission will impose upon the railways without any practical compensation therefor, the writer expresses the hope that the commission will amend its rules by omitting altogether the provision for 'depreciation,' and amend the provisions for 'renewal' to represent the current cost of replacing all equipment vacated. This change will furnish the commission with reliable data about the depreciation which has been carried into the operating expenses of the railways and enable it to order adjustments suitable to each case if any such should be necessary."

CENTRAL ELECTRIC RAILWAY ASSOCIATION—FIRST FALL MEETING

The first meeting of the Central Electric Railway Association after the summer recess was held at Indianapolis on Sept. 24. President F. D. Carpenter presided. At the opening of the morning session the president announced that the executive committee had appointed the following committees:

Committee to handle reply to letter from United Commercial Travelers asking that arrangements be made so that baggage might be checked through between points on different roads using the new interline ticket: A. L. Neercamer, F. D. Norveil, W. S. Whitney and H. G. Hanndon.

Committee to discuss feasibility of uniform bill of lading: J. C. Forrester, I. H. Crawl and C. G. Lohman.

The president also announced that the next meeting of the association would be held at Lima, Ohio, Nov. 17.

The Central Electric Traffic Association will meet at the same place on Nov. 16. It also was announced that a special meeting of the Traffic Association would be held at Indianapolis on Oct. 3, to discuss interline traffic matters. President Carpenter asked for a more hearty co-operation on the part of the members in answering correspondence of the secretary.

A paper on "Recent Development of Lightning Arresters," by David M. Rushmore, General Electric Company, was read by G. A. Worcester, of the same company. This paper was published last week. Mr. Worcester also described the aluminum or electrolytic lightning arrester in detail. This arrester is suitable for use on both a.c. and d.c. lines. On 600 d.c. circuits two cells are used, placed electrically in series. The peculiar characteristic of the electrolytic arrester is that it is self-adjusting and regulates the discharge in accordance with the rise of impressed pressure and the amount of discharge does not depend on the regular voltage. An important advantage is that the arrester can safely discharge for a long period of time while other types of multigap arresters not having as great heat storage capacity will break down under such severe conditions. The discharge with the aluminum arrester may safely take place for three or four hours.

Aluminum arresters for a.c. service have been on the market for one year, those for d.c. two years. The arresters when used on d.c. trolley circuits are spaced two per mile. These arresters will momentarily carry a discharge of 1000 amp at double the line voltage and so relieve the line from voltage peaks sometimes experienced with the magnetic blow-out arresters.

In place of the paper by Amos J. Coover, as announced on the program, Mr. Coover exhibited a model section of track with a new design for bracing. F. W. Shelton, formerly with the Fort Wayne & Springfield Railway Company, presented a paper describing the catenary overhead construction of this line which operates at 6600 volts alternating current.

On motion the standing auditing committee was instructed to prepare and submit for approval a standard

form to be used in reporting the sale of interline tickets. This committee was instructed to report at the meeting of the Traffic Association at Indianapolis on Oct. 3.

The first paper of the afternoon session was entitled "The Mechanical Application of Wireless or Radio-Teleggraphy to Railroads," by Dr. Frederick Millener, Omaha, Neb. This paper was published in the ELECTRIC RAILWAY JOURNAL for Sept. 26. In discussing his paper, Dr. Millener described a storage-battery car which he is using in his experiments at the Union Pacific Railroad shops at Omaha. By means of wireless apparatus it is possible to control the movement of this car at a distance of 5 miles, there being no operator on the car. Experiments with this car are being made with a view to the development of a cab signal which may be used in railroad-train operation. The trials thus far have shown that by means of wireless control it is possible for a dispatcher to show a signal in the cab of any one of 35 moving trains or cars.

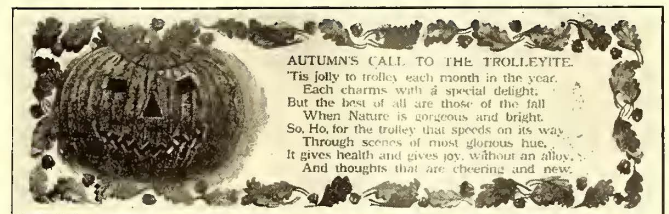
E. C. Carpenter, claim agent, Indiana Union Traction Company, presented his paper, "The Benefits of the Index Bureau," which appeared on page 704 of the issue of last week. President Carpenter urged the associated roads to co-operate with the secretary in making reports for the purpose of maintaining this index system.

E. G. Hindert, formerly chief engineer of power, Cleveland, Southwestern & Columbus Railway, presented a paper on "The Electric Railway Return Circuit." This paper was published last week. A general discussion followed.

The last topic of the meeting, "Tariffs, Concurrences and Their Filings," was discussed by F. D. Carpenter, F. D. Norveil and W. S. Whitney. Owing to the complicated nature of the interline traffic problems and the lateness of the hour it was decided to postpone their settlement until the next meeting of the Central Electric Traffic Association on Oct. 3.

ADVERTISING FOR FALL TRAFFIC

In the issue of Sept. 19 an account was given of some of the methods followed by the passenger department of the Boston & Northern Railway Company in promoting traffic and several advertising cards were reproduced. Recently the company has got out new posters of a striking pat-



Poster for Attracting Autumn Traffic

tern for the purpose of increasing its autumn excursion business, and one of them is shown herewith. It is printed by lithography in four colors. This paper is indebted to H. A. Faulkner, passenger agent of the Boston & Northern Street Railway Company, for a copy of this poster.

The electric railway from Hyvinge, Helsingfors, to Naasestate, a distance of 9.3 miles, built at a cost of about \$80,000, and in operation since January, was recently officially inaugurated.

The electric railway at Rosario, Argentina, is nearing completion and several sections have been inaugurated during the year. When completed there will be 75 miles of track. The total cost of the road is \$3,600,000.

CONVENTION OF THE ARKANSAS ASSOCIATION OF PUBLIC UTILITY OPERATORS

The first annual convention of the Arkansas Association of Public Utility Operators was held at Little Rock, Ark., on Sept. 17 and 18. D. A. Hegarty, treasurer and general manager of the Little Rock Railway & Electric Company, is president of this new association, which now has about 75 members. It is the purpose of this new body to discuss questions of policy and methods of operation for all classes of public utility organizations. The program as followed at the first meeting included papers on various subjects of interest to railway, electric lighting, water and gas property officials:

PROGRAM

Source of Supply of Water for Municipalities, by B. C. Fowles, general manager Pine Bluff Water & Light Company.

Roadbed Construction and Pavement, by Edw. Hardin, superintendent railway department, Hot Springs Water, Light & Railway Company.

Advantages and Disadvantages of Tungsten Light to

city ordinances, specifying classes of rails, roadbed and tie methods that have proved unsatisfactory. It is the want of accurate knowledge and the want of confidence in the sincerity of street-car companies on the part of the city law-makers that delay the use of methods that have proved themselves superior to all others.

This article will be confined to a brief sketch of the factors that go into building a permanent track suitable for all conditions and which has been generally accepted as the most economical in the long run.

SUB-GRADE

The sub-grade should have at least 10 in. of ballast, with a bottom course of No. 4 crushed rock, fully 6 in. in depth, topped to the level for the reception of ties with finer crushed rock and should be well tamped. The coarse rock at the bottom will assist in drainage, which is very important, and every advantage should be taken of all opportunities to run tile from the sub-grade into the city drainage. On account of the necessity for drainage, no concrete should enter into the composition of the sub-grade.

TIES

Tie construction is always feasible and always reliable, and the tendency is to return to ties after a trial of stringer construction—wherever ordinances do not prevent. The



Group of Delegates at the Convention of the Arkansas Association of Public Utility Operators

Central Stations, by T. R. Phillips, superintendent lighting department Little Rock Railway & Electric Company, and C. E. Mathes, superintendent sales department, Little Rock Railway & Electric Company.

Theft of Current, Water and Gas, by D. A. Hegarty, general manager Little Rock Railway & Electric Company.

PAPER ON ROADBED AND PAVEMENT

Edw. Hardin, superintendent railway department Hot Springs Water, Light & Railway Company, read a paper on "Roadbed Construction and Pavement," of which the following is an abstract:

During the past decade the necessity for permanent track construction for paved thoroughfares has reached the street-car companies of the South and West even in the cities of comparatively small population. Not many years since want of practical experience, with a considerable variety in both material and method to choose from, caused great diversity in roadbeds. In this way every possible manner of construction and character of material has been thoroughly tested.

However, the application of the knowledge gained by actual experience is greatly hindered in many instances by

treated tie may now be accepted as the most satisfactory for the permanent bed, especially where paving is used. Not only are treated ties thoroughly satisfactory, but also they are the cheapest in the long run. This is particularly true where tie-plates are used, and their use always is advisable. With ties placed 21 in. between centers there is no necessity for tie-rods, except where especially high rails are required.

RAILS

Only the standard T-rail may be considered as satisfactory for general use. This section presents the best form of rail yet devised. It has the most economical disposition of weight, is thoroughly adaptable to all conditions of traffic and rolling-stock construction, and at the same time does not require expensive factory-made curves.

The use of girder and grooved rails is now almost limited to meet requirements of ordinances enacted without regard for the valuable practical experience of recent years. Even where unusually high rails are specified, the T-rail is still the most satisfactory when considered from every standpoint.

A standard T-rail varying in weight from 60 lb. to 90 lb., considering traffic and team travel as well as number, weight and speed of cars, will meet all conditions.

The 60-ft. rail is better than the shorter one for obvious reasons—the duration of the rail itself, smooth riding surface, ease on rolling stock and lesser number of joints.

BONDS

The bonds are one of the most important factors in construction. The protected bond is the most satisfactory and is the only bond that may be considered permanent. In placing bonds the bond terminals and the reception holes in the rails should both be thoroughly tinned. Next, the terminals should be well soldered and then allowed to cool completely before being compressed. The pressure should be applied until after the soldering because of the vast difference in the relative expansion of copper and steel. In this way only can a perfect contact be effected—one that will allow no space for the formation of verdigris, cause no undue loss in the transmission of current and not require further expense in maintenance.

JOINTS

The under-truss or base supported joint has largely solved the vexatious problem of joints. In the angle-bar and fish-plate joints with all the protection of spring nut-locks, etc., bolts will stretch with use and the unavoidable stresses will make themselves evident. With the under-truss or base-supported joint the lost motion is to a great extent taken up as it develops. The joint holds the receiving rail rigid and level, thus preventing the pounding and wear on the ends where the rails are most susceptible to wear and need the most protection.

CONCRETE

After the sub-grade and track have been completed then the entire surface of the prepared roadbed should be covered with a layer of concrete. The concrete mixture should be made of good standard quality of Portland cement in the following proportions: One part cement, three parts clean, sharp sand and five parts clean, crushed stone. This mixture should be used as wet as possible, but care should be taken that the quantity of water is not so great as to cause the cement to be washed away and wasted. When the cement has been thoroughly tamped and rammed between ties it should cover the entire roadbed to a depth of at least 6 in.; in fact, to as great a depth as the rail height and dimensions of paving material will permit.

The concrete should be given every possible opportunity to set. Where conditions will permit two or three days should elapse before the paving is placed and then if possible a week longer before traffic is opened. This frequently is not the case, but when full 10 days' time is given the cement in which to set then the very best roadbed conditions are assured.

Upon the concrete foundation there should be laid a cushion of fine, sharp, clean sand. This should be from $1\frac{3}{4}$ in. to $1\frac{1}{2}$ in. deep in the center, to $\frac{3}{4}$ in. to 1 in. deep at the rails, thus allowing a $\frac{1}{2}$ -in. crown.

PAVING

These considerations contemplate paving with blocks, brick or stone. In fact, paving between tracks, to be at all satisfactory, must be in the form of blocks because repairs will be necessary from time to time regardless of every care that may be taken. A rigid roadbed also must be guarded against.

Vitrified paving brick is the most satisfactory paving material. If nose brick are used next to the rails inside they should be laid as compactly as possible. Every tenth course should be brought to line and a 1-in. expansion joint be placed every 50 ft. When the brick have been laid they should be well rolled with a roller weighing at least 1000 lb. This forces them to proper surface. The expansion joints should be filled with a mixture of pitch and sand and the entire surface flooded with cement grouting, thus completely filling every crack and crevice.

No matter how light the traffic may be, hard center special track work will be the more economical in the long run and much more satisfactory in use.

The relative cost of track with material and methods as here described will compare very favorably with any other method that has been attempted when the permanency of this track is considered and the lessened cost of maintenance and wear on rolling stock are credited to the original cost as time elapses.

ELECTRIFICATION OF THE MELBOURNE SUBURBAN RAILWAYS

The Victorian Railways Commissioners have received from their consulting engineer, Charles Merz, of London, his report upon the proposed electrification of their suburban system. A brief abstract was published last week, but the full report is now available. The system is an important one, involving some 240 miles of track and some 126 stations, and the total cost if it be completely converted would exceed £2,000,000.

The report is a comprehensive one, and deals with the whole question of electric traction as applied to heavy suburban railways so fully that it is of more than local interest, containing, as it does, a review of the present position of electric traction. Its primary object is to determine whether the substitution of electric traction for steam traction on the Melbourne suburban system is financially justifiable, and this involves a decision as to how, from an engineering point of view, such a change should be carried out, and the advantages it would offer to the public.

The report is divided into five sections:

- (a) The general problem and the system of electric traction recommended.
- (b) Power production and the supply of power to the trains.
- (c) Rolling stock for electric service.
- (d) Incidental considerations.
- (e) Estimates of capital outlay, revenue and expenses and conclusions.

The work is divided into three progressive stages in order to facilitate the discussion of various questions as follows:

Stage I.—The Port Melbourne, St. Kilda, Sandringham and Broad meadows branches. Route length, 29 miles.

Stage II.—Stage I and, in addition, the Camberwell and Williamstown branches. Route length, 65 miles.

Stage III.—The complete scheme, including, in addition to Stage II, the Sunshine, Coburg, Preston, Heidelberg, Dandenong and Mordialloc branches. Route length, 124 miles.

In the introductory letter Mr. Merz points out that the steady growth of the suburban traffic will make it necessary for the railways to provide additional facilities before very long, in any case, and the present is, therefore, a good time for examining the possibilities of electric traction. So many heavy suburban lines in Europe and America have been converted to electric traction that there is nothing experimental about the present proposal, and the results obtained on these other systems enable a pretty close estimate to be made of the results obtainable in Melbourne.

MELBOURNE SUBURBAN SYSTEM

The report shows that the Melbourne suburban system is a very much more important part of the railway system as a whole than is the case in most great cities, and this is clearly proved by the following table:

TABLE I.—VICTORIAN RAILWAYS—ANALYSIS OF PASSENGER TRAFFIC.

		Year ending June 30, 1906.			
		Track Mileage	Train Mileage	Passenger Journeys	Passenger Receipts
Suburban System*	.....	298	2,772,669	59,477,123	£ 595,669
Remaining Systems	.....	4,006	4,080,135	5,218,252	903,118
Total	.....	4,304	6,852,804	64,695,375	£ 1,498,787
Percentage	.....	6.92%	40.5%	92.0%	39.7%

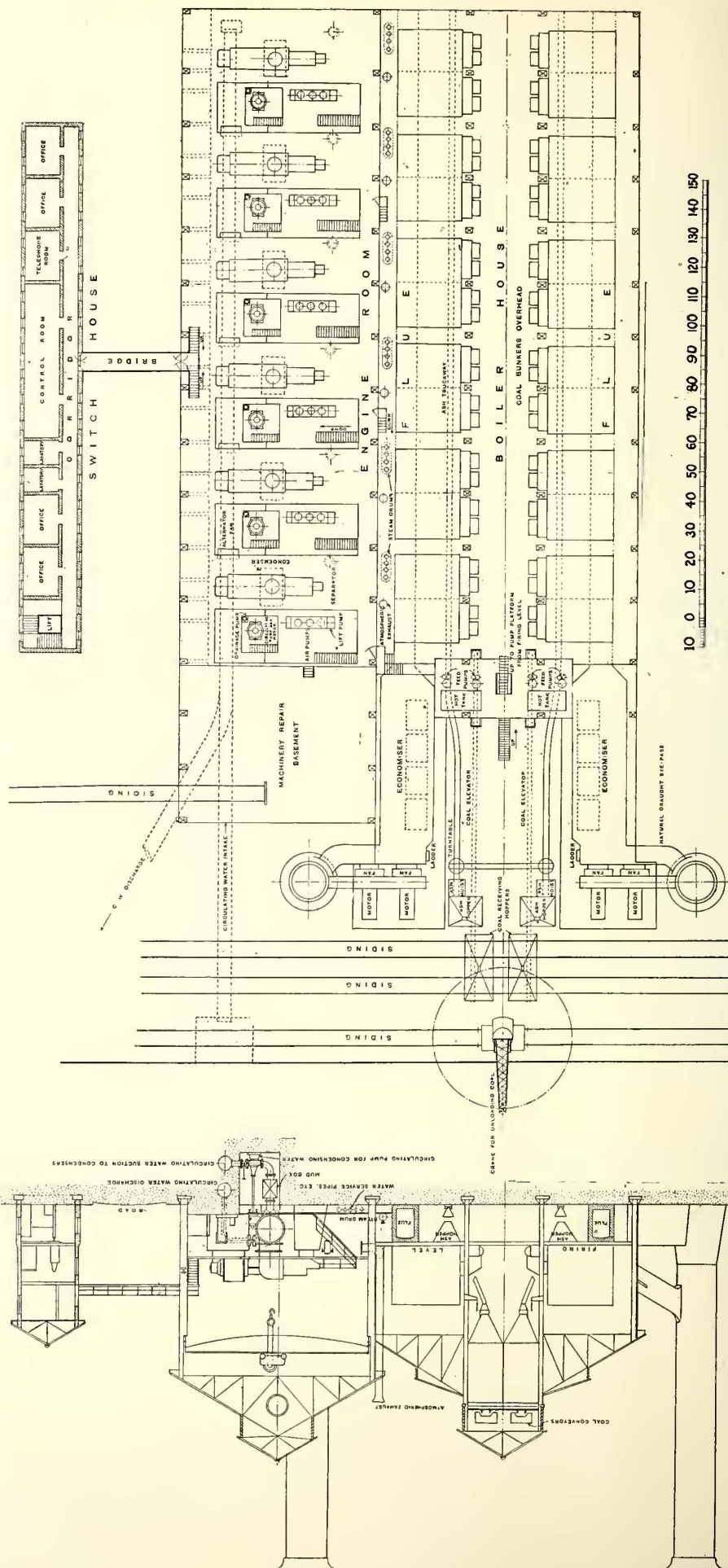
*The figures given for the suburban system in Table I include the returns for race and special traffic, and also those for certain outlying sections not comprised in Stage III above, viz.: Sunshine to St. Albans, Heidelberg to Eltham, and Mordialloc to Frankston.

While possibly the Melbourne system is not unique in this respect, it is doubtful, he says, if on any other large

railway system the metropolitan traffic forms so large a proportion of the whole passenger business dealt with, either as regards train mileage or receipts. In numbers, of course, the suburban trains exceed the other trains in most great cities, but while in London, for instance, the long distance trains entering the metropolis on an ordinary day number about 500 out of a total of 8000, or some 6 per cent, in Melbourne they form only 4.5 per cent of the total. The best comparison is that of the train mileage; if all the railways having termini in London be considered, it will be found that the suburban train mileage on those railways is less than 20 per cent of their total train mileage; in New York the proportion is even less. In Victoria, however, the suburban train mileage forms as much as 40 per cent of the total train mileage.

CAUSES OF PREPONDERANCE OF SUBURBAN RAILWAY TRAFFIC

The preponderance of suburban passenger traffic over the country traffic has continued for some years in Melbourne, and it appears likely to continue. This seems to be due, firstly, to the large population of Melbourne (526,400) compared with that of the whole State, amounting to 42.5 per cent, as compared with London, 20 per cent; Edinburgh, 7.3 per cent; Paris, 6.9 per cent, and Berlin, 5 per cent. Secondly, to the fact that people are scattered over a wider area than is general even in American cities, and certainly to a greater extent than is usual in Europe. This is apparent from the density of population, which in Melbourne is 2064 per square mile, as against 9510 in Greater London, 11,195 in New York, 19,060 in Edinburgh, and a still greater density in Paris and Berlin. In Sydney, Perth and Wellington the populations are all denser than in Melbourne. Thirdly, in large measure, to the fact that a large part of the business, which in a European or American city would be dealt with by electric tramways or separate electric railway systems, is dealt with in Melbourne by the suburban railways, which carry about one-half of the total traffic handled by the tramways and suburban railways. This may be due in large



Report on Melbourne Electrification—Plan and Section of Proposed Power Station

part to the fact that the tramway system, though excellent, is operated by cable, and is necessarily restricted in regard to facility of extension and ability to deal commercially with light and infrequent traffic.

The growth of travel in Melbourne and suburbs, except during the depression of 1902-4, has been continuous and marked, as the following table shows:

TABLE II—GROWTH OF SUBURBAN TRAVEL IN MELBOURNE

Year Ending June 30	Passenger Journeys	Journeys per Head of Population	Receipts	Receipts per Head of Population
1898	Railways..... 38,912,263 Tramways..... 36,245,280	159	£405,776	£1.64
1899	Railways..... 41,406,374 Tramways..... 38,875,210				166	424,708	1.68
1900	Railways..... 45,103,936 Tramways..... 41,661,580	177	479,080	1.82
1901	Railways..... 50,120,411 Tramways..... 47,195,647				196	531,595	2.00
1902	Railways..... 52,392,749 Tramways..... 47,261,572	199	540,671	1.98
1903	Railways..... 50,064,367 Tramways..... 46,832,910				193	527,228	1.91
1904	Railways..... 49,495,738 Tramways..... 49,183,742	195	531,902	1.94
1905	Railways..... 55,156,545 Tramways..... 50,297,357				206	554,532	1.96
1906	Railways..... 59,477,123 Tramways..... 52,925,654	216	595,669	2.04
1907	Railways..... 64,162,344 Tramways..... 60,558,098				236	645,448	2.20

In discussing the advantages of electric traction Mr. Merz says that it involves a higher capital expenditure than steam operation, but possesses many advantages from the

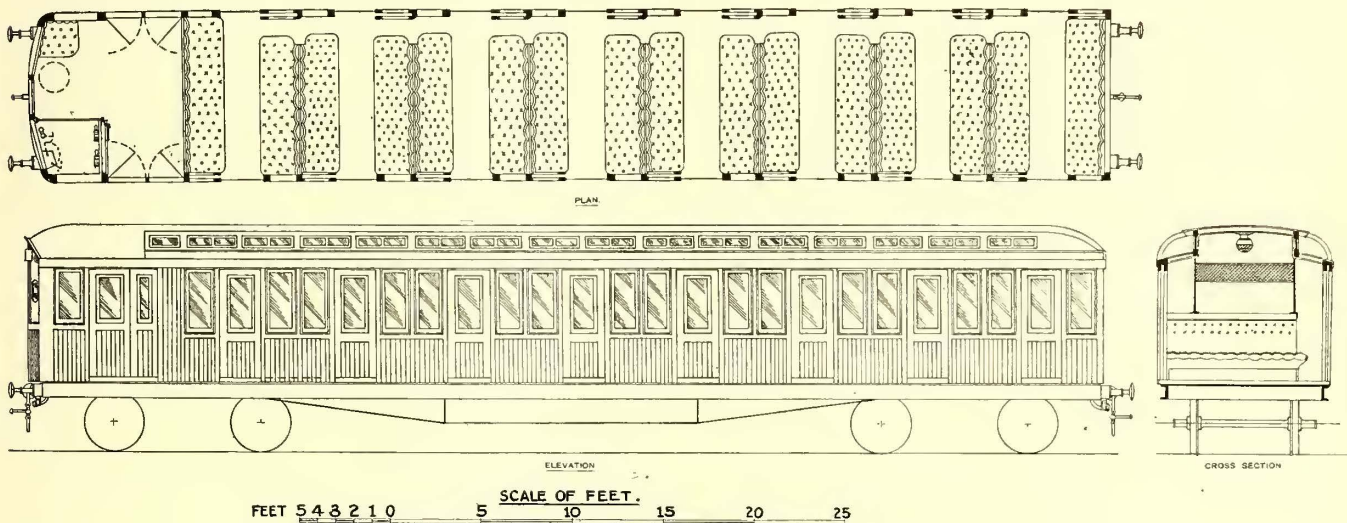
TABLE III.—SCHEDULE SPEED ON VARIOUS ELECTRIC LINES

Railway	Length of Single Line, Miles.	Average Distance between Stops, Yards.	Schedule Speed M. P. H.
Boston Elevated.....	16	2,400	13.0
Central London	13	840	14.0
Lancashire & Yorkshire (Liverpool & Southport).....	69	2,290	30.0
Liverpool Overhead.....	13	670	19.0
London Metropolitan District.....	56	1,042	15.7
Manhattan Elevated	118	1,775	14.7
New York Central (New York).....	85	4,600	21.0
New York Subway	55	2,030	16.0
North Eastern (Tynemouth Branches).....	73	2,900	20.5
North Western Elevated (Chicago).....	25	1,320	10.0
Prussian State Railways (Hamburg-Altona).....	45	2,190	19.1
Pennsylvania R. R. (West Jersey).....	160	8,800	28.3
Paris Metropolitan	30	540	16.2

To obtain this increased schedule speed the trains must be equipped with the multiple unit system to enable them to be started more rapidly, but the acceleration must not be so great as to be uncomfortable to the passengers or to cause the wheels to slip.

PROPOSED TRAIN SERVICE

The normal train recommended by Mr. Merz for Melbourne would be made up of an equal number of motor and trailer coaches; that is to say, the unit is a two-coach train. On outlying routes, of course, the traffic will sometimes be dealt with by a single coach train, but on busy



Report on Melbourne Electrification—Proposed Car for Suburban Service

public point of view, from that of the railway manager and from that of the financial return to the company.

SCHEDULE SPEED

The characteristic feature of electrical operation is the possibility of increased schedule speed. The average length of run on the Melbourne system is about 3/8 mile, and the average time taken rather more than 2 1/2 minutes. With electrical operation it would be possible to accelerate the multiple unit trains much more rapidly than with steam, and reduce this to about 2 minutes.

Numerous attempts have been made on other railway systems to obtain high acceleration with steam locomotives, but it has not been very satisfactory. In actual operation it is usual to take advantage of the high acceleration possible with electric traction, and for economy's sake to accomplish as much as possible of the run by coasting. It is always possible in emergency, as when it is desired to make up time, to cut down coasting and keep the current on until the brakes are applied. The present schedule speed of the Melbourne system averages about 16 m.p.h., and with electric traction it is proposed to increase it to 20 m.p.h. Table III shows how this compares with other railways.

routes, especially at morning and evening, the trains will consist of two, four, six or eight coaches.

The number of trains run would, of course, depend upon the growth of traffic. The Government's Railway Department estimates that by the year 1912, the first complete year of electrical operation, the traffic, if steam working be retained, will have increased by 20 per cent, but that if electric operation be adopted the increase will be not less than 25 per cent, possibly more.

A timetable has therefore been prepared on this basis.

There is one feature of electrical operation to which special attention was devoted in the report, and this is the desirability and possibility with electric traction, of keeping a uniform and frequent service of trains on each line throughout the day. It is obviously a great convenience to the traveling public to catch a train without having to consult a timetable, and people are thus encouraged to travel at all times—not merely at the accustomed times of rush traffic, but during the, at present, slack portions of the day. Every additional passenger at such hours represents revenue which is practically all profit as compared with additional passengers carried during rush hours. This—the

difference between the profit made out of a passenger, depending upon the hour of the day at which he travels—is true of all systems, but the difference is greater with electrical working than with steam working, because with electrical working the capital charges (which depend upon the maximum rather than upon the average traffic) are of more importance relatively to the operation expenses than they are with steam. Again, with electrical operation, and especially with the multiple unit system, it is possible to run short trains at regular and frequent intervals with maximum economy. With electrical working, therefore, a frequent service should be maintained throughout the day.

After a careful consideration of the various systems, all were eliminated with the exception of the low-voltage unprotected third rail, high-voltage protected conductor rail and the single-phase overhead wire system.

Calculations showed that a protected conductor rail system with a voltage of 800 has many advantages over the unprotected third rail system at a lower voltage, from both financial and operation points of view, even under the particularly favorable conditions of track and climate existing in Melbourne. The choice then became narrowed down to that between the 800-volt direct current protected conductor rail system and the single-phase overhead wire system.

It has been claimed that even for such suburban railways on which there is a frequent service the single-phase system shows very considerable advantage in first cost compared with the direct-current system. This, however, has not proved to be the case after having worked out in detail the cost of dealing with the Melbourne suburban traffic, for not only would the overhead lines be very much more costly than has frequently been stated to be the case, but the additional cost of the large number of train equipments required would practically balance the extra expenditure on the substations required in the case of the direct current system; in fact, the very complete investigation which was made into the first cost of providing the electrical equipment for the Melbourne Suburban Railways has confirmed the opinion as to the relative first cost of the two systems which Mr. Merz had formed in investigating similar problems for the other suburban railways. In the case of Melbourne it is only when including very long and sparsely populated lines, such as the Frankston branch, to which in any case Mr. Merz does not consider the extension of electrical operation justifiable, that the single-phase system showed any appreciable saving in first cost over the direct current system.

However, when coming to consider the total annual cost (which is the important figure), including operating expenses and interest charges, it was found that under Melbourne conditions the direct current system shows a saving compared with the single-phase system. It was, therefore, not possible to recommend the adoption of the single-phase system on financial grounds. The single-phase system was considered to be also in more of an experimental stage, as, according to Mr. Merz, the only line at all comparable with the Melbourne suburban system which is operating to-day on the single-phase system is the Hamburg-Altona line, and this line has only been in regular operation since January of this year, and even yet can hardly be considered complete. He admits that there are also many cases in America where long distance inter-urban lines are operated on the single-phase system, but considers these not comparable with the Melbourne system for complexity, as they mostly operate single cars, not

multiple-unit trains as contemplated in Melbourne, while the New Haven line operates locomotives only. He therefore recommended the direct-current 800-volt protected conductor rail system as the right one to adopt for Melbourne. The arguments on the conductor system are summed up as follows:

As a mechanical structure a protected conductor rail, compared with overhead wires, is superior in both simplicity and reliability; it not only needs less repair, but less inspection. Most important of all, the inspection and repair work can be done by the ordinary permanent way staff in daylight and when the service is in full operation, whereas the inspection and repair of overhead wires requires a special staff, not only because it has to be done at night, but also on account of the class of labor required. This is obviously very important in a country where electrical operation has not hitherto been adopted and where labor is dear. When it is also considered that the wear on the conductor rail is practically negligible whereas the wear on the overhead wire is not inconsiderable, this point becomes still more important. While overhead wires may be in every way suited to long lines on which the service is not so frequent and where there is consequently less wear and tear and where, also, there may be time between trains to inspect and to do repair work, the protected conductor rail which needs less inspection and can be, and is, inspected at any time by the ordinary permanent way men, offers a more reliable service on a busy suburban system.

YARRAVILLE STATION

The power station recommended by Mr. Merz is to be at Yarraville, and should contain eight turbo generating sets installed, each of 5000 chp. Superheated steam and a generating pressure of 12,000 volts are proposed. A plan of the station recommended is given on page 752.

ROLLING STOCK

In considering the question of the most suitable type of rolling stock for a large, important and rapid suburban service, Mr. Merz says the two chief considerations are: First, to secure the maximum passenger accommodation for a given weight of coach; this is particularly important with electrical operation because the amount of electrical energy used in driving the trains increases in almost direct proportion to the weight. Second, to adopt a design which will enable the passengers to enter and leave the trains at the different stations as rapidly as possible, thus reducing the time spent in stops to a minimum and thereby increasing the schedule speed. The first of these considerations is best met by making each car as long and as wide as is permitted by curves and clearances. The second consideration is almost entirely one of arrangement of seats and doors.

The two types of cars in most general use are the end-door cars with continuous aisle, known as the American car, and the European compartment car. For main-line and high-speed service the former has great advantages. The design may be made rigid and strong and the side framing being without openings or breaks for doors, can be built in the form of a continuous girder. Again, the aisle admits of communication throughout the length of the train, a requirement of all modern main-line stock. In America, and to a certain extent in England, this type of car has also been developed for suburban working. For subway or underground railways dealing with very heavy traffic, it has undoubted advantages, if trainmen are stationed at each end of each car to open and shut doors and to hurry up passengers in entering and leaving cars at stations, and if it be a question rather of coping with the traffic than of operating at minimum cost. It is not necessary to delay the starting of the trains to shut the doors,

an important matter with high acceleration, and passengers do not waste time walking up and down the platforms looking for seats as they do where there are separate compartments. Further, this design provides for a maximum of standing room, which for short-journey traffic is a valuable feature.

On the other hand, for ordinary suburban working, the expense of so many train attendants is prohibitive and without them there is delay in discharging and loading trains where all passengers have to leave by comparatively small end doors. The importance of providing ample door area may be judged from the fact that on some lines where corridor stock is in use additional doors in the ends and also in the center of the cars have been proposed and in some cases adopted. In the Melbourne suburban system Mr. Merz did not think that the extra expense of the train crews involved would be justified or that this type of car, the chief merit of which is large standing space, is the best suited to conditions where many people have daily to travel considerable distances.

If it were a question of building new rolling stock Mr. Merz considers the type of stock originally suggested by the chairman of the Railway Commissioners and designed by the chief mechanical engineer while he was in Melbourne, would be the most advantageous. This design, illustrated on page 753, is really a combination of the two types, being a cross-compartment car with communication way between compartments. Such a car has been used on certain of the American and German lines and has been proposed for some of the English systems. The use of sliding doors that can be easily closed by the passengers without danger even after the train starts, avoids delay at stations compared with the ordinary outward swinging doors, the absence of which also enables the cars to be built of the maximum width, since even if the sliding doors were inadvertently left open, there would be no danger of their striking passing trains as would be the case with swinging doors. This car, Mr. Merz considers, would retain the large seating capacity of the cross-compartment cars and also obtain the advantages of the communication passage between compartments and is a combination of the best points of the latest types of suburban stock of Europe and America. In order that ample experience of the proposed new type of car may be obtained before building it in large quantities the construction of two complete six-car trains is recommended.

GENERAL ESTIMATES

Mr. Merz makes the following general estimates:

TABLE V.—SUMMARY OF CAPITAL EXPENDITURE INVOLVED BY ELECTRIC TRACTION AND RESULTANT INCREASED INTEREST CHARGES

	Port Melbourne and St. Kilda Branches	Stage I	Stage II	Stage III
	£	£	£	£
1.—Power Station, high-tension feeders and sub-stations.....	221,333	386,357	580,430	846,689
2.—Track Equipment, including low-tension cables and alterations to track.....	53,330	170,328	311,035	568,139
3.—New Rolling Stock (less credits) alterations to existing stock, and electrical equipments	67,674	221,657	426,044	754,881
4.—Inspection Pits and Car House.....	14,392	23,538	45,179	57,341
5.—Total Cost of Electrical Scheme.....	356,729	801,880	1,362,688	2,227,050
6.—Less Expenditure to deal with Traffic by Steam Traction.....	41,730	149,945	274,696	425,590
7.—Net Additional Cost of Electrical Scheme.....	314,999	651,935	1,087,992	1,801,460
8.—Interest Charges at 4% per annum.....	12,600	26,077	43,520	72,058

A summary of the capital expenditures involved with electric traction is given in the following table:

TABLE VI.—OPERATING EXPENSES WITH ELECTRIC TRACTION

	Port Melbourne and St. Kilda Branches	Stage I	Stage II	Stage III
	£	£	£	£
Electric Traction:—				
Operating Costs—Total.....	18,563	73,571	140,362	219,700
Operating Costs per train mile.....	13.34d.	12.1d.	11.52d.	11.03d.
Steam Traction:—				
Operating Costs—Total.....	23,100	85,877	160,097	246,967
Operating Costs per train mile.....	19.38d.	19.06d.	18.98d.	18.93d.
Difference in Favor of Electric Traction—Total.....	4,537	12,306	19,735	27,267
Per train mile.....	6.04d.	6.96d.	7.46d.	7.90d.

Mr. Merz estimates that allowing 4 per cent interest charges on the cost of the new equipment and changes required, the percentage increase in revenue from electric operation above the assumed normal growth required to balance the additional capital charges, less the saving in operation expenses, would be as follows for the different stages:

- Port Melbourne & St. Kilda branches, 16.1 per cent.
- Stage I, 6.2 per cent.
- Stage II, 5.8 per cent.
- Stage III, 7.8 per cent.

CONCLUSIONS

The conclusion is that the application of electric traction to the Melbourne Suburban System is justified from a financial point of view and that it will result in greatly improved service to the public.

COMMUNICATION

A REASONABLE RETURN ON RAILWAY CAPITAL

SEPT. 24, 1908.

To the Editors:

The determination of what constitutes a reasonable return upon a railroad investment is important enough to warrant careful consideration, and the writer hopes that all those who are able to contribute to this discussion will freely give the benefit of their views in order that in the end we may have some fairly practical, definite answer to the question. The editorial and the communication from "Consulting Engineer" in the Sept. 5 issue of your paper gives us a good start.

The writer not only agrees with "Consulting Engineer" in his opinion that the investment on which the reasonable return is to be expected should represent the actual original cost of the road, plus the amount expended upon subsequent betterments and extensions, but also believes that to this amount should be added the capital necessary for the general conduct of the business, and what is even more important, the franchise value, even in instances where the franchise was given gratis. Certainly if a company is obliged to tie up \$100,000 in coal, storeroom supplies, etc., it should be entitled to take from its earnings an amount equal to the prevailing rate of interest on the sum so tied up. To set a value upon a franchise extended gratuitously to the company is a matter which at first thought appears to be beyond the bounds of sound reason, but when it is considered that the franchise itself is of far greater value after it has been exercised and a profitable business built up than it was as a mere piece of paper conveying power to do business, it will be seen that the company itself has, through its expenditures, services of experts, etc., given the franchise its real value, and has conveyed to it a worth which it did not possess at the time it was issued by the authorities. It may be true that the city or town extended this franchise gratis solely because

such action on their part would be a benefit to the railroad company, but I am more inclined to believe that municipalities in issuing franchises keep in mind the fact that the building of a railroad is an enormous benefit to the territory served, in that it gives another source of revenue from taxation, builds up the community, and in other ways assists in establishing and maintaining a healthy condition of business. Why, then, should we not expect to receive a return on the value of this franchise which by our own efforts is given a value which it did not have before, and if we are entitled to such a return, upon what basis should the valuation be fixed?

After we have settled what items should be included in the investment upon which we are entitled to a return, let us consider the injustice of putting any limit on the income received by a railroad or other public service corporation. It would appear that any body of men with sufficient sagacity to see and take advantage of a situation where a railroad can be built along strictly legitimate lines, and made profitable, should be entitled to all the benefits which can be derived from the enterprise, minus certain reasonable deductions for taxes. For any authority to put an absolute limit upon the earnings of a company, in the writer's opinion, simply discourages thrift and enterprise, whether that limit be 10, 20, or 30 per cent. To say to a company, "you are earning a certain rate of interest, and must now spend all amounts in excess of such rate on improvements, or restrict these large earnings by reductions of fare," is an encroachment upon the sanctity of private capital. If the road is in first-class physical condition, and the rates offered are well down on the list of averages, why should not those financially interested be entitled to all they can earn from the situation, less a reasonable tax upon gross earnings? It is the intention of the writer to offer the suggestion that instead of putting an absolute limit upon the stockholders' profits, it would be more equitable to insist first upon a first-class condition of the property, good service and reasonable rates, and then apply a State or municipal tax upon the gross earnings of the property, graduating this tax so that the rate will increase as the gross earnings exceed a certain limit. At the present time the State tax upon the gross earnings of railroads in New York State is 1 per cent. Why not make this tax applicable to companies receiving, say, up to 15 per cent return on the investment, and increase the rate as the profits to the stockholders exceed the above return? Such an arrangement would not absolutely limit the income derived from the property, and would be a great benefit to the State.

It must be remembered that the number of railroads paying dividends is a great deal smaller than is generally realized by the public, and it is very probable that these same stockholders who are affected by the suppression of generous dividends in one case may be delving into their pockets to make good the deficits on other roads with which they are connected.

MANAGER.

ROCHESTER EMPLOYEES' ANNUAL BALL

The Rochester Railway Employees' Association will hold its annual ball Nov. 18, 1908. This is the ninth year in which it has given a ball for the benefit of the members, each year surpassing the previous one financially and socially. The association this year intends to eclipse all former events, and with this end in view has engaged the ball room of the Hotel Seneca, which is the largest, as well as the finest, hall in Rochester.

HEARING BEFORE PENNSYLVANIA RAILROAD COMMISSION ON OPERATING PROBLEMS

An informal conference between the members of the Pennsylvania Railroad Commission and representatives of electric railways in the State, called to consider several subjects relating to operation of the roads, was held at the State Capitol, Harrisburg, on Tuesday, Sept. 29.

Nathaniel Ewing, chairman of the commission, said in opening the conference that several important points had been brought to the attention of the commission in its investigations of the causes of accidents. Of particular importance among these points were the questions of the advisability of permitting passengers to ride on front platforms, and the speed and signals to be observed at curves. Mr. Ewing said that the commission had thought of making recommendations to the railways regarding these matters, but had decided it would be best to learn the views of officials of the companies before taking definite action. He added that the railway officials knew far more than the members of the commission concerning practical matters of operation, and the object of the meeting was to consider the questions fully. The commission would be glad to receive all the information which the railway representatives could give.

F. B. Musser, president of the Pennsylvania Street Railway Association and president of the Central Pennsylvania Traction Company, said that the executive committee of the association held a meeting in the morning of that day, and thought that Charles O. Kruger, second vice-president and general manager of the Philadelphia Rapid Transit Company, would ably present the views of all the railways.

Mr. Kruger then said that at the morning meeting the use of the front platforms by passengers had been discussed, but that not much discussion had taken place on the other topics suggested. It was thought by most of the roads that when passengers were carried on the front platforms of open cars they should be seated. Different opinions were expressed, he said, regarding the advisability of carrying passengers on the front platforms of closed cars. One company had experienced considerable difficulty in inducing miners to use the front platforms, but had continued the custom of carrying these passengers in this part of the cars because the grimy clothes worn by the men were objectionable to other travelers. Mr. Kruger said that the Philadelphia Rapid Transit Company had been trying to educate people to enter the car by the rear door and leave by the front door. On the whole, he was not in favor of carrying passengers on the front platform of closed cars, but did not know what the effect of a change in custom in this respect would be.

L. C. Bradley, Eastern Pennsylvania Railways Company, said that his road had seven different divisions in the Pottsville district. One of the services performed by the lines is the transportation of miners to and from their work. When the shifts of miners start and resume work in the morning and evening, special cars for the exclusive use of these men are run. In some instances special fares are made for these cars, and in other cases there is no change from the regular fare. In addition to making provisions for this traffic, however, the company had to provide means of transportation for men who stopped working at irregular times through the day. The miners are covered with coal dust and their clothes are greasy. If they occupy a seat in a regular car, the seat is soiled and other people will not use it. If the miners remain on the rear platform, people boarding the car brush against their clothes. Mr.

Bradley said that 90 per cent of the miners are foreigners. If they board a car they take an entire seat. It is not practicable to operate special cars through the day, as the number of men carried outside of the regular time for starting and stopping work was small. In regular service the company uses solid vestibuled cars, without interior compartments. Two years ago it was the custom to permit the men to occupy seats in regular cars, but by judicious education the use of the front platform had been established. The men had been shown that no disrespect to them was intended and that the change was designed to enable the company to provide clean cars and to keep from damaging the clothing of other passengers. Although the men resented the change at first, the company had succeeded in demonstrating to them that the desired arrangement was for the good of all concerned. On regular open cars the miners sit between the seats and let their feet hang out over the running board.

Commissioner Ewing spoke of the arrangements for colored people in separate compartments in the South, and in response to an inquiry Mr. Bradley said that compartments could be arranged in cars. Mr. Bradley added that cars used by the miners became greasy, and it would be difficult for other passengers to walk out through a compartment occupied by miners. If miners were on the inside of the car they would crowd against the other passengers.

J. W. Brown, West Penn Railways Company, said that miners were not allowed to ride in closed cabs with motormen on the lines of his company.

T. A. Wright, Wilkesbarre & Wyoming Valley Traction Company, said that on the lines of this company, extending practically 90 miles through the Wyoming Valley, rules prohibited passengers from riding on the front and rear platforms. The rule regarding the front platform was designed to promote safety of operation, and that concerning the rear platform was intended to facilitate the entrance and exit of passengers. Mr. Wright said that a small percentage of the miners availed themselves of the opportunities afforded for washing and changing their clothes at the mines, but that, although there had been some complaint, the people condoned this feature of the situation, as the business of the valley was largely dependent on the mining industry. He said it was desirable to prevent motormen from talking with passengers, but that it was difficult to do away with such conversation on open cars. If the car had a front seat it was difficult to keep passengers from using it. Mr. Wright said that compartment cars had worked out satisfactorily in the solution of this problem, and in purchasing equipment he thought he would continue that method of arrangement. During the rush hour, Mr. Wright said, it was almost impossible to prevent the crowding of the rear platform.

John Y. Boyd, a member of the commission, said that the idea of the commission was to restrict the passengers on the front platform of a closed car to the number that could be seated.

The difficulty of preventing conversation between passengers and motormen was discussed, and Chairman Ewing said that an effort should be made to prevent it. Commissioner Boyd asked Mr. Bradley about the suitability of compartment cars at Pottsville. Mr. Bradley said they were not suitable unless it was thought desirable to mix the passengers.

Mr. Wright said that the miners' compartment seats extended longitudinally, and while some grease gets on the

floors of the cars, the great difficulty is with the seats. Commissioner Boyd said he realized that it might be disagreeable for ladies to pass through a compartment of this character when it was crowded. Mr. Wright said that while passage through the compartment was objectionable, people usually avoided it by getting on the end of the car which held the regular compartment.

In reply to a question from Commissioner Boyd, Mr. Musser said it was hard to enforce regulations about unclean passengers, who usually thought that their money entitled them to ride where other passengers sat.

Chairman Ewing asked if all were agreed that it is a dangerous practice to permit passengers to ride on the front platform of closed cars. John A. Rigg, Interstate Railways Company, said that he would be willing to carry out a recommendation of the commission, but that the commission should so arrange it that railways would not get into serious trouble on account of a change in their practice.

Commissioner Ewing said that the commission was particularly desirous to avoid any interference by passengers with motormen. He inquired whether the objection to having passengers ride on the platform applied to the rear platforms as well as those in the front of the car.

George Hoeger, Schuylkill Valley Traction Company, said that if the number of passengers on the front platform was limited to the seating capacity, there would be no interference on the part of the passengers with the motorman. The interference took place when passengers were permitted to stand on the platform.

Chairman Ewing said that the extent to which the attention of the motorman was distracted from his duties also entered into the problem.

John A. Rigg thought that any regulations preventing passengers from riding on front platforms would compel companies to change their equipment to closed cars.

Mr. Kruger said that his company tried to carry the people, and referred to the difference in seating capacity between open and closed cars. He thought that the commission might minimize the danger of accidents if it limited the number of passengers on the front platforms of open cars to the few that could occupy the seat. He believed in trying, however, to prevent conversation between passengers and motormen.

William H. Lanius, Hanover & McSherrystown Street Railway, spoke of the small number of accidents attributable to the fact that passengers rode on the front platform.

Chairman Ewing said that the subject should be considered from two aspects: (1) That the presence of passengers on the front platform might be the cause of accidents; (2) that when passengers rode on the front platform there was greater liability of serious results if an accident did occur.

R. P. Stevens, Lehigh Valley Transit Company, said that to render useless seats for 10 passengers by prohibiting the use of seats on platforms would be a serious handicap to the railways. He said that he had placed closed cars in service at times during the open season, and had seen them pass carrying but two or three people, while open cars would be crowded. He thought it an impossibility to attempt to keep passengers from crowding on open cars. At the time of the Allentown fair a rule was enforced during the first day that no passengers should ride in the front vestibules, but before the week was concluded passengers were riding on all parts of the cars, and any

congestion that might have resulted from an attempt to reduce the number would have been difficult to overcome.

Mr. Kruger asked whether the commission had ever noticed that the percentage of accidents is higher on ordinary days than on special days of unusually heavy traffic.

Chairman Ewing said he supposed this fact was based on the principle that the greater the danger, the greater the precautions that are taken. He said that the attention of the commission was called occasionally to accidents resulting from the fact that passengers were permitted to ride on the running board, and spoke of European regulations concerning the crowding of cars. Mr. Hoeger said that he happened to be abroad a year ago and saw some instances where the rule as to the number of passengers to be carried per car was absolutely disregarded. In one instance the motor car hauled two trailers, and the passengers crowded on the cars at all points, even riding on the roof.

John A. Rigg said that his company had some lines with heavy grades. The cars were run on these lines on 60-second headways, and he said it would not be wise to operate them on a closer schedule. Reduction in the number of passengers per car would affect operation.

Walter A. Rigg, United Traction Company of Reading, said that people standing on corners always assumed that the first car that arrived was the last that would ever leave that point. He spoke of the difficulty of preventing persons from crowding on cars.

The question of speed on curves was brought up, and Mr. Wright said it seemed to him that local conditions should govern the treatment of every case. He said that the speed that could be made safely on curves depended on whether the danger is one of collisions with other cars or of harming other travelers on highways.

Commissioner Boyd spoke of an accident at Johnstown which was due to the loss of control of the car.

John A. Rigg said that while he did not speak for all representatives of railways who were present, he would be willing to enforce a regulation providing for a speed of 8 miles an hour on any curve of less than 50 ft. radius.

Mr. Wright said that a motorman could see around a curve of 150 ft. radius with sufficient distinctness to prevent accidents.

Chairman Ewing said that the commission had no idea concerning what speed would be desirable. It was simply trying to get information on the subject.

Mr. Brown said that the problem of speed on curves would involve also the question of grades. The conditions of track and other factors would have to be considered. One motorman might bring his car down a grade when the rail was dry at a speed of 10 or 12 m.p.h. with perfect safety and another man would not be able to exceed 5 or 6 m.p.h. if he had to contend with a wet rail. Mr. Brown had in mind the movement of cars on down grades. Commissioner Boyd said he realized that if any attempt should be made to enforce absolute rules, the maximum speed would be determined by the possible worst conditions of operation.

Mr. Bradley said that before the commission took any action, he would like to have its representative make a personal investigation of the conditions under which the Pottsville Union Traction Company operates. This company is part of the system of the Eastern Pennsylvania Railways Company, of which Mr. Bradley is general manager.

Commissioner Boyd said that he was very much interested in Mr. Bradley's statement of his difficulties but there were

certainly large areas in Pennsylvania with substantially the same conditions in the mining industry where the same difficulties were not met. Mr. Bradley said that the company purchased recently eight new cars for one division. These were used to accommodate summer tourists who wanted to make a trip through the coal fields. The longitudinal seats were equipped with canvas for the use of miners who might ride on the cars, but it was found that the crews were stopping, without specific instructions, so that regular passengers would board the cars at the end opposite the one where the longitudinal seats were situated. This was done because the motormen had found that the regular passengers did not like to walk through the miners' compartment.

C. L. S. Tingley, American Railways Company, which controls the Scranton Railway Company, said that a rule on the Scranton system prohibited passengers absolutely from riding on the front platforms of interurban cars. There had been some difficulty with the transportation of miners who stopped work at irregular times through the day. Mr. Tingley said that the out of town lines in the Scranton system were used almost entirely by miners, but in the city of Scranton conditions were different and much damage had been done when soiled clothes came in contact with the apparel of regular passengers. He said that for the purpose of keeping the seats clean, the conductors were supplied with clean waste but that they did not always use it. The miners generally rode on the front platforms of city cars but sometimes crowded into the seats.

Commissioner Boyd said that the problem was a very difficult one to solve.

The hearing was concluded after a suggestion had been made by the commission that a committee be appointed representing the members of the Pennsylvania Street Railways Association and the railways in the State which are not members of that association. This committee will confer further with the commission.

The railway representatives present at the hearing were given a lunch by the Pennsylvania Steel Company after the hearing had been concluded.

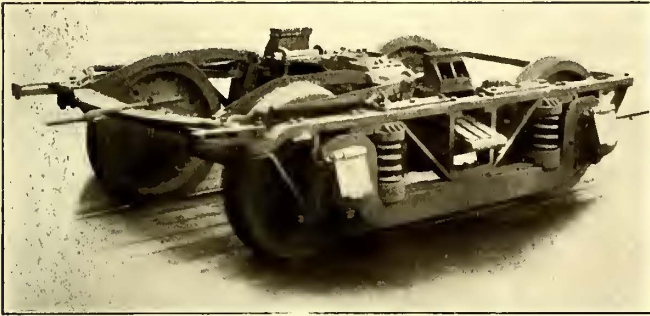
In addition to the members of the commission named in the foregoing, the Pennsylvania commission was represented by Charles N. Mann, the third member, and by Harry S. Calvert, secretary.

The railway representatives present were:

- F. B. Musser, Central Pennsylvania Traction Company, president of Pennsylvania Street Railway Association.
- C. O. Kruger, Philadelphia Rapid Transit Company.
- John A. Rigg, Interstate Railways Company.
- Walter A. Rigg, United Traction Company of Reading.
- George Hoeger, Schuylkill Valley Traction Company.
- J. W. Brown, West Penn Railways Company.
- John Francies, Pittsburg Railways Company.
- J. I. Quigley and E. R. Sponsler, Lewistown & Reedsville Elevated Railway.
- T. A. Wright and E. L. Lurdermuth, Wilkes-Barre & Wyoming Valley Traction Company.
- M. H. Kulp, Shamokin & Edgewood Electric Railway.
- D. C. Haldeman, Hagerstown Railway.
- J. E. Wayne, Chambersburg, Greencastle & Waynesboro Street Railway.
- F. D. Shaffer, Citizens' Traction Company, Oil City, Pa.
- Wm. H. Lanus, Hanover & McSherrystown Street Railway.
- R. P. Stevens, Lehigh Valley Transit Company.
- E. M. duPont, Johnstown Passenger Railway.
- C. H. Bishop, Valley Traction Company.
- C. L. S. Tingley, Scranton Railway Company.
- Chas. H. Smith, Lebanon Valley Street Railway.
- Harrison R. Fehr, Easton Transit Company.
- D. B. Fretz, Chambersburg & Gettysburg Elevated Railway.

MOTOR AND TRAILER TRUCKS FOR THE DENVER & INTERURBAN RAILROAD COMPANY

The American Locomotive Company has recently completed an order of 16 motor and eight trailer trucks for the Denver & Interurban Railroad Company for service on the new line now in operation between Denver and Boulder.



Denver & Interurban Railroad Company—Motor Truck

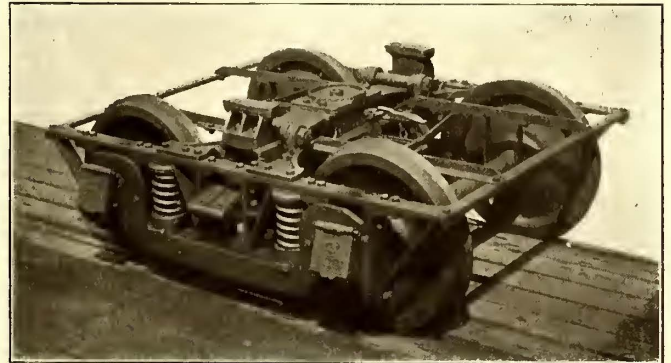
The electrical features of this railway were described in the *ELECTRIC RAILWAY JOURNAL* of Sept. 5, 1908.

The motor cars for which the trucks were designed are of two types, a passenger coach and a combination passenger and baggage car, one of the first being shown in the accompanying illustrations. The two types are of the same general dimensions, but differ in seating capacity. They have an underframe of structural steel and are 55 ft. 6 in. long over all and 10 ft. wide. The passenger coaches seat 59 passengers, while the combination cars with seats in the baggage compartment, as they are at present equipped, accommodate 54 passengers each. These cars are equipped with both the d.c. and a.c. systems, the d.c. system being used within the limits of Denver and Boulder and single-phase current outside of the city limits. The trailer cars are 53 ft. 10 in. long over all, 10 ft. wide, and seat 58 passengers.

The cars are operated in trains of one motor and one trailer car, and are now in hourly service between Denver

state that the operation of trains in this manner is now being considered.

The motor trucks are the builder's standard type "A" design, of two-bar equalizer, swinging bolster truck, and are built to carry a maximum load of 38,000 lb. at the



Denver & Interurban Railroad Company—Trailer Truck

center plate. The top frame is of wrought iron in one piece and is $2\frac{1}{8}$ in. thick, $4\frac{1}{8}$ in. wide at the sides, and 3 in. wide at the ends. The frame trusses, which are also of wrought iron, are 1 in. thick and 4 in. wide. The bolster is a steel casting of I-section and box construction at the ends and center. Chafing or rubbing pieces are fitted between bolster and transoms. The transoms are 10 in. steel channels weighing 35 lb. to the foot, and, following the builder's standard practice, are carried on shoulders provided on the frame center braces, thus reducing the shear on the bolts through the braces and transoms. Side frames and transoms are tied together by cast steel transom gussets, which also include bearings for swing link pins, brake hanger lugs, and brake release spring brackets. The gussets have a liberal bearing on both frames and transoms and make a rigid connection between the two. The spring system is in accordance with M. C. B. standard practice, triple elliptic bolster springs being used. Each truck is equipped with two Westinghouse No. 148 125-hp motors.



Denver & Interurban Railroad Company—Standard Motor Car

and Boulder, a distance of about 30 miles. Traffic has been so heavy at times, however, that it has been found necessary to run the trains in two sections, each composed of a motor and trailer car. Experiments have also lately been made of running the two sections in one train, and the results have been so satisfactory that officials of the road

The trailer trucks are of the same design as the motor trucks, but, of course, of lighter construction. They are built for a maximum load of 25,000 lb. at the center plate. The wrought iron top frames are $1\frac{1}{4}$ in. thick and $4\frac{1}{8}$ in. wide at the sides, and 3 in. at the ends. The frame trusses are $\frac{3}{4}$ in. thick and 4 in. wide. The swinging bolster is of

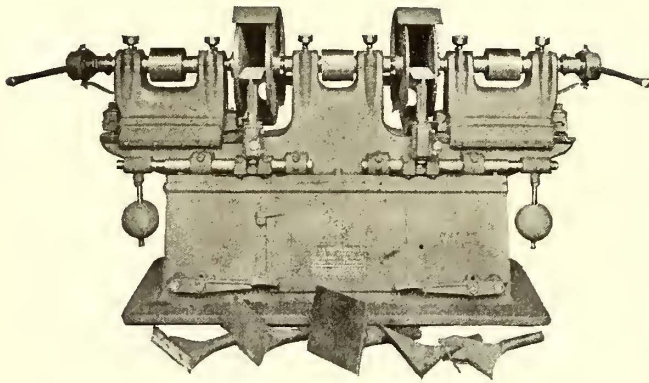
cast steel of the same design as that of the motor trucks and the transoms are 8-in. steel channels, 21¼ lb. to the foot. The cast-steel transom gussets include bearings for the swing link pins. Safety straps are provided over bolster, under spring plank, axles and brake bottom connections.

The principal dimensions of the trucks are as follows:

	Motor Truck.	Trailer Truck.
Gage of track.....	4 ft. 8½ in.	4 ft. 8½ in.
Wheel base	7 ft. 6 in.	5 ft. 6 in.
Height from top of rail to top of car body center plate (with car body light).....		37½ in.
Height from top of rail to bottom of car body center plate (car body light).....	33 5/16 in.	
Maximum load at center plate..	38,000 lb.	25,000 lb.
Wheel, diameter	38 in.	38 in.
Axles, diameter	6½ in.	M.C.B.
Journals, diameter and length..	5½ in. x 10 in.	5 in. x 9 in.
Weight without motors, wheels or axles	8,500 lb.	
Weight without wheels or axles	6,500 lb.	
Weight complete without motors	13,900 lb.	
Weight complete		11,400 lb.

A FOUR-DISK GRINDER

The Diamond Machine Company, of Providence, R. I., has brought out lately the 6 K 4 Gorton belted grinder with four disks and two swivel heads, which combines two of its double disk grinders in a single machine to save space, belting, countershafting and power. The machine is especially adapted for grinding, in two stages, work having parallel sides or sides at a slight angle. One pair of disks



Four-Disk Grinder

does the roughing and the other pair the finishing. In this case two operators are necessary.

Both sliding tables swivel and can be clamped at any angle up to 10 deg. This allows slight angles to be ground at one setting. Either head can be slid back to accommodate work of any length up to 12 in., or be removed entirely to convert one side of the machine into a single-end grinder. The disks can be brought up by hand or foot power, or by both at once. The foot power can be left off if necessary, but it does not interfere with the regular hand-operating device. The tables are counterweighted, which makes the operator's work very easy.

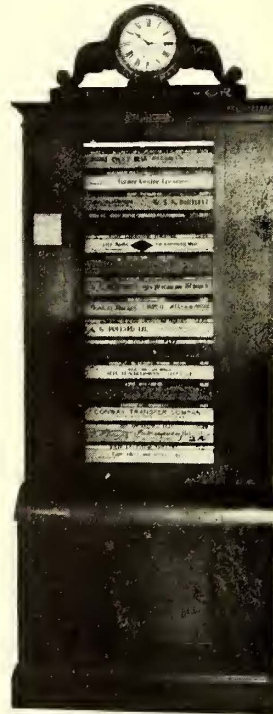
The regular equipment of this machine consists of eight 18-in. steel disks, 24 assorted emery circles, one disk cutter, one cementing press, three steel wrenches, two dust exhaust hoods, eight work tables and one double-drum countershaft to run at 540 r.p.m. The height from floor to spindle is 40 in.; base, 27 in. x 69 in.; net weight with accessories, 3200 lb.

While this machine was originally designed and is shown as a regular disk grinder, a chuck with emery ring may be used, so that heavy grinding can be done. If it is found necessary, one set of chucks can be used on one end of the machine and roughing work done in that way and finished between a pair of disks at the other end of the machine.

NOVEL AUTOMATIC TIME TABLE INSTALLED ON BOSTON & NORTHERN SYSTEM

There has recently been installed in the main waiting room of the Boston & Northern Street Railway Company at Merrimack Square, in Lowell, Mass., a novel design of automatic timetable. The device is illustrated by the accompanying half-tone. It consists of a case about 7 ft. high over all and 18 in. wide at the bottom surmounted by a standard clock and provided with a central display space in which the leaving times of all cars at the square are shown for periods of 15 minutes each throughout the day. At intervals of one minute the timetable changes in accordance with a master clock inside the case. Each car due

to leave at any given minute is registered on a printed black card with white letters set in a light metallic frame and these cards move forward one step each minute, keeping the movements of all cars for the next 15 minutes constantly in sight. These time cards are ½ in. wide each and can be seen in the engraving, although the lettering appears small. Between each pair of time cards is set an advertising card 2 in. wide on which is displayed the name and notices of a local merchant or commodity on sale in the city.



Automatic Time Table

The time clock runs continually and the sheet of cards upon which the car leaving times are displayed runs from 6 a.m. to midnight. Each minute in these 18 hours is displayed on the endless chain of cards, there being 1080 cards of each kind shown daily. As the top card passes from view the movement of the sheet brings another into range of vision at the bottom, the one which has disappeared working its way down in the rear of the case, where it is automatically folded and put in readiness for service during the ensuing day.

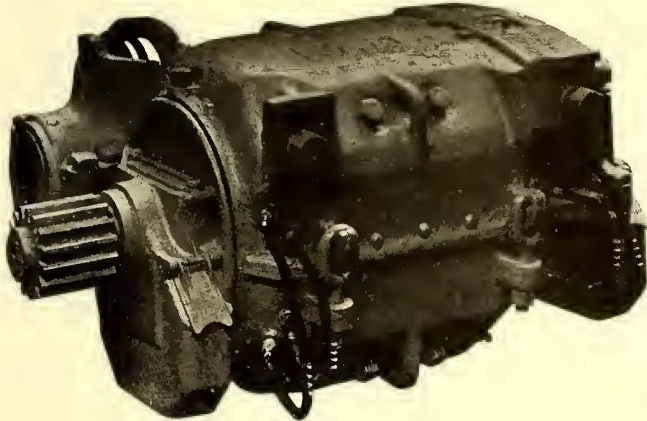
The cards are rotated by a 1/16-hp electric motor, which is operated by a battery of 12 Gordon cells located in one end of the case, which is about 19½ in. deep. The operation of the motor and the movement of the clock on top of the case are controlled by a master clock inside the case through a relay contact and local battery circuit. The master clock is of the Standard Electric Time Company's make and is guaranteed to keep within five seconds a month. The Gordon battery lasts from eight to nine months without renewal.

The clock is manufactured by the Automatic Timetable Company, of Lowell, under patents of D. G. Hurd. It has been found to save numerous inquiries of the starters at

the square. The Boston & Northern and the Old Colony Street Railway companies have arranged to have a large number of these timetables located in transfer points on their systems. The machines are not sold by the makers, but the space for their installation is secured from the railway company and the income derived solely from the advertisements. Standard rates for display cards are \$1 per card per year. To be in constant sight on the time table a merchant must contract for 72 card spaces, at an expense of \$72 per year. The table is designed to stop running at midnight and to start automatically at 6 a. m. This is arranged by a cam fastened to a gear in the clock, which breaks contact for six hours. The installation of the automatic time table has been found to stimulate the work of car crews, who appreciate the importance of arriving on time at the square in making their regular trips.

BRITISH INTERPOLE MOTOR

Dick, Kerr & Company, Ltd., of London, have recently put on the market an interpole motor which it is thought will meet with a large demand not only on account of the well-known advantages of interpole motors, but because of the common use of electric brakes in Europe. The current demand made on the motor during electric braking is heavy, but short in duration, and the ability to take up such loads without sparking, characteristic of the interpole motor, should commend it for this service.



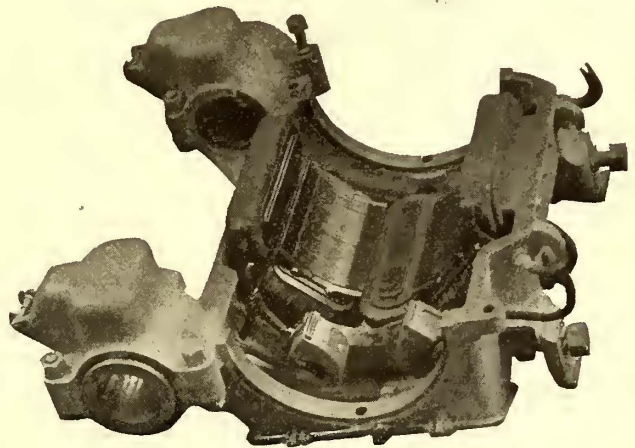
Motor Complete with Pinion

The field frame of the new motor is of soft steel in two parts with machined joints to insure a good magnetic circuit. The lower half of the frame is hinged to the upper half. The armature bearing boxes are contained in a separate solid casting held to the main motor frame by a tongued and grooved joint and firmly fixed by studs. The main pole pieces are of laminated steel sheet punchings riveted together and bolted to the inner surface of the frame. The field coils are held in position by two flat steel springs, each capable of exerting a pressure of about 400 lb., which are inserted between the field coil and the shell. The interpoles are of solid steel and are attached to the frame by rivets. The interpole field coils are clamped in position by independent screws which are locked to prevent any movement. The ends of all field coils are finished off with strong bronze terminals for inter-connection after they are assembled in the motor frame.

The armature core is built up in the usual way, with distance pieces to permit free circulation of air. Specially good ventilation of the armature is insured by means of the fanning action of the connections between the arma-

ture coils and the commutator bars. These connections are made of thin, flat copper strips, which when the armature rotates act as fan vanes and draw a current of air right through the motor. The air enters through the opening on the top of the shell at the gear end, and is drawn toward the center of the armature core, passing through the end winding to the gear end, the armature core, the end winding at the commutator end, and finally passing out of the shell at the opposite end to which it enters. The action of the fan vanes is centrifugal and therefore independent of the direction of rotation. This method of construction has the additional advantage of enabling the armature leads to be carried straight to the commutator risers, which greatly simplifies matters when it is required to remove the commutator, as the complete winding is left intact.

The armature bearings are lubricated by oil rings. The



Armature and Fields of Interpole Motor

oil, after being used in the bearing, is drained back to a reservoir, where it has an opportunity to settle. The axle bearings are also lubricated by oil, but in this case a wick arrangement is employed.

The gear case is of malleable iron bolted to the motor case at three points.

ENGLISH WHEEL GUARD AT SCHENECTADY TESTS

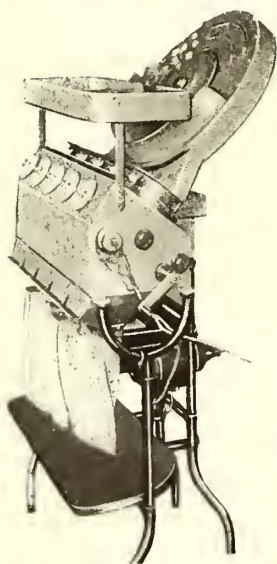
The fender and wheel-guard tests proposed by the Public Service Commission of the First District, New York, and now under way at Schenectady, have attracted such wide interest that at least one English manufacturer has entered the competition. This is Hudson & Bowering, Ltd., of Manchester, whose life guard is very extensively used abroad. A representative of this company made a special trip for this purpose and the guard submitted was tried on Saturday, Sept. 26. In the first series the company made 3.75 out of a possible 4 points; in the second series, 3.417 out of 4 points; in the third, 3.417 out of 4 points, and in the fourth, 3.4 out of 4 points. The guard was subjected to 48 trials in all.

COIN SEPARATING AND COUNTING MACHINE FOR RAILWAY WORK

The coin separating and counting machine shown in the accompanying cut is one which has been designed by the Johnson Coin Counting Machine Company, of Chicago, to meet the requirements of electric railway offices. The company is not new in the electric railway field, because many street railway treasury departments are now using its simpler machines which count and wrap one denomination of a coin at a time. The apparent demand for a machine which would include the reliable features of this company's single denomination counting machine and which would also separate the various classes of coins turned in by the conductors has led to the design of the separating and counting machine illustrated.

The new machine is said to be as accurate as the Johnson coin counter now in use. In use, as the money from the conductors' envelopes is received, it is passed through the machine without first having been sorted by hand. The machine not only sorts the coins into bags containing single denominations, but each coin is counted as it goes into its proper bag and individual records are exhibited.

The record of the count is shown in duplicate: A series of dials which can quickly be set to zero for counting each envelope show the number of coins of each denomination from



Coin Counter and Selector

one envelope; also, another set of counters exhibit the total number of coins that have passed through the machine into the money bags below.

The mechanical construction of this machine is simple and rugged, so that it will count accurately under the most severe operating conditions. The separation of the miscellaneous coins is accomplished by a revolving disk provided with a number of apertures which will hold only one coin at a time. Below these apertures is a stationary base plate over which the disk revolves. The plane of this disk is set at an angle of 45 deg. so that the coins in the apertures may be sorted by gravity as they pass over a series of slots cut in the base plate. The first of these slots, which is reached by a coin as it moves in the revolving disk, just permits a dime to fall through; through the second slot a cent will drop; through the third a nickel; through the fourth a quarter and through the last slot a half-dollar. As the revolving disk carries the coins to these slots they drop through their proper openings into tubes which lead them away to the counting heads. These counting heads are operated from a single shaft connected with the electric motor which drives the entire

machine. As the coins pass through the counter the two records of the count are taken by indicating counters similar to those used as cyclometers and by the setback disks. If current is not available for operating the counting machine it may be run by hand.

When sorting and counting a large number of coins of miscellaneous sizes this separator and counter will handle about 1000 coins per minute. This includes the separation, counting and the passing of the coins of each denomination into separate money bags.

The utility of such a machine in the cashier's office of a street railway company will easily be appreciated, as it carries out its program in but one-fifth of the time ordinarily required. The first public exhibition of this machine will be made by the manufacturer at the Atlantic City convention on Oct. 12 to 16, where it will be shown in operation.

NOVEL TYPE OF STEEL POLE FOR LINE CONSTRUCTION, CARS, ETC.

The Diamond Steel Pole Company, Philadelphia, has brought out a new type of steel pole which is of square section formed from two flat tapered plates sheared from a rectangular plate of the length of the desired pole. The tapered plates are first flanged along the longitudinal edges and then troughed longitudinally, forming a tapered flanged trough or angle section, as shown in the accompanying cut. Two of these sections are forced together longi-



Specimen of Steel Tubing Made of Two Flat Tapered Plates Flanged as Shown

tudinally forming a hollow, square pole with two weather-proof joints. The pole formed in this way is symmetrical throughout, has no transverse joints and cannot be telescoped.

A pole of this design can be made of any desired taper and used for any purpose from fence post to flagpole. When designed as a trolley pole for cars, it is made of very thin sheets, which give the greatest strength for the least weight of metal. Consequently, less tension is required and the damage to overhead wires minimized. As the pole is tapered throughout, it cannot slip out of the socket in the stand, while its square section greatly reduces the time needed to set the pole properly. After the pole is once set in the stand, it cannot be twisted as may happen in the case of round poles. The design also allows considerable deflection without permanent set. An important commercial advantage is the fact that the installation of this pole involves no change in the stand or trolley harp. This pole is now ready in any desired thickness and taper up to 40 ft. The company is planning to exhibit its designs of poles for cars and overhead construction at the Atlantic City convention.

RECENT ALLIS-CHALMERS RAILWAY ORDERS

In the following statement of orders received by the Allis-Chalmers Company from traction companies throughout the country for new equipment or improvements to existing apparatus, will be found an indication of more than ordinary significance, when coupled with reports of returning activity in nearly all manufacturing lines. Electric railways are, normally, among the largest purchasers of machinery and other material, so that renewed buying on their part cannot fail to be reflected in every department of industrial activity.

The Omaha & Council Bluffs Street Railway Company recently placed an order for 14 straight air-brake equipments. This is the second contract awarded Allis-Chalmers Company by the Omaha city and interurban line. The Dennison & Sherman Traction Company, Dennison, Tex., recently changed the brake equipments on all of its cars, the new equipment being for straight air, with 20-ft. compressors of the same company's manufacture. The Northwestern Elevated Railway Company, of Chicago, has awarded a contract for air compressors and governors for the 20 new cars now being built at the Pullman shops. The compressors will be of the Allis-Chalmers Type C-5 enclosed design, 35 ft. capacity per minute, and the governors are the manufacturer's standard Type OB pneumatic. The Yonkers Railroad Company, Yonkers, N. Y., recently placed an order with Allis-Chalmers Company for 20 straight air-brake equipments. These include the new AA-6 16-ft. enclosed compressor and OB governor.

Allis-Chalmers Company has also completed installation of automatic brake equipments on cars for the Niagara Gorge Scenic Railway, Niagara Falls, N. Y., and, among others, additional orders for railway motors, controllers, compressors, governors or complete air-brake equipments have been received from the following railway and car-building companies: Winnebago Traction Company, Oshkosh, Wis.; Milwaukee Northern Railway Company, Cedarburg, Wis.; McGuire-Cummings Manufacturing Company, Paris, Ill.; New York, New Haven & Hartford Railroad Company; New Orleans Railway & Light Company, New Orleans, La.; East Liverpool (Ohio) Railway & Light Company; Utica & Mohawk Valley Traction Company; Virginia Passenger & Power Company, Richmond, Va.; Roanoke Railway & Electric Company; Connecticut Company, New Haven, Conn.; Fremont City Railway Company, Fremont, Ohio; Eastern Pennsylvania Railway Company, of Philadelphia, Pa.; Springfield (Mass.) Street Railway Company; Interborough Rapid Transit Company, New York; Western Ohio Railway Company; Connecticut Valley Street Railway Company; Lehigh Valley Traction Company; Exeter, Hampton & Amesbury Street Railway Company; Lancaster (Ohio) Traction & Power Company; Indiana Union Traction Company; Interurban Railway & Terminal Company, Cincinnati, Ohio; Porto Rico Railways Company, San Juan, Porto Rico; Ohio Electric Railway Company; Angola Railway & Power Company, Angola, Ind.; Western Ohio Railway Company, Lima, Ohio; Worcester Consolidated Street Railway Company, Worcester, Mass.; Warren Street Railway Company, Warren, Pa., and Eastern Ohio Traction Company.

Among companies making large additions to their power equipment or taking advantage of the present excellent opportunity to bring their generating stations to a state of higher efficiency are the following: Winona Interurban Railway, Warsaw, Ind.; New Jersey & Pennsylvania Traction Company, Trenton, N. J.; Wausau Street Railway

Company, Wausau, Wis.; Chicago, Indiana & Southern Railway; Petaluma & Santa Rosa Railway Company, Petaluma, Cal.; Indianapolis, Columbus & Southern Traction Company and others.

From the above it will be seen that the buying comes from practically all parts of the country and indicates more of a revival in activity than has been noticeable for many months past.

Another feature of the situation which is of interest, reported by Allis-Chalmers Company as builders of the Gates gyratory breaker, is the fact that quite a number of traction companies having their own rock-crushing equipment, or allied interests in control of it, have been putting it in good repair as well as adding to it. Evidently this is with the intention of materially improving roadbeds during the remaining open months.

THE BUCKEYE GAS ENGINE

The Buckeye Engine Company, of Salem, Ohio, which has been constructing steam engines for over 60 years, now has entered the gas-engine field with the four-cycle type described in the following paragraphs. The single-acting engines are built in sizes up to 300 brake hp and the double-acting engine in single units from 250 brake hp up to 3000 brake hp and pairs from 500 brake hp up to 6000 brake hp.

In this gas engine the compression is nearly uniform from maximum load to about one-fourth load. The mixing apparatus intermingles the gas and air just before the supply passes into the cylinder, operating as follows: With a maximum load the mixture gives the highest mean effective pressure, together with a maximum amount in volume and maximum compression. When the load falls off the mixing apparatus automatically weakens the charge by admitting less gas, until the load on the engine decreases to about 25 per cent of maximum. After this the charge is no longer weakened, but remains constant in quality while varying in quantity.

Slight throttling from one-quarter load to purely friction loads is used because it is impractical under normal conditions to attain a high combustion efficiency and regular ignition with a charge sufficiently attenuated to control the speed of the engine at friction load. There is a complete mixing apparatus for each combustion chamber and a gas valve in each mixing chamber which shuts off the gas completely except during the period when its corresponding combustion chamber is being charged. This prevents surging and fluctuation of mixtures through the piping system except as determined by the governor.

These engines can be operated with either the jump or make-and-break spark. All double-acting engines have two or more igniters in each combustion chamber, and if desired, can be operated with both high and low tension ignition simultaneously. The company recommends its electromagnetic make-and-break system. The current operates the igniter mechanism by an iron-clad electromagnetic hammer, the circuit being periodically completed and the time of ignition controlled by a timer, to insure proper thermal utilization of the fuel. This timer has the following adjustments: First, automatic control directly by the governor, depending upon the power developed during any instant; second, hand adjustment of all igniters simultaneously; third, hand adjustment of each igniter independently while the engine is running.

The builder has found the regulating system of these engines so effective that they appear adapted for any class of installation where close regulation is required. They

are also as noiseless as a well-constructed steam engine owing to the quiet operation of the gear for lifting and seating the valve. The valve gear is of the poppet and butterfly type. The four-stroke cycle engines are so rated that 10 per cent overload may be carried continuously.

The cylinders are constructed with admission valves on the top and exhaust valves on the bottom of the cylinder to allow ready drainage of the oil and other deposits through the exhaust valves. These two valves are widely separated because where both open into the same space, the fresh charge, entering the cylinder through the chamber surrounding the exhaust valve, is heated and expanded, thus decreasing the weight of the charge and reducing the power output.

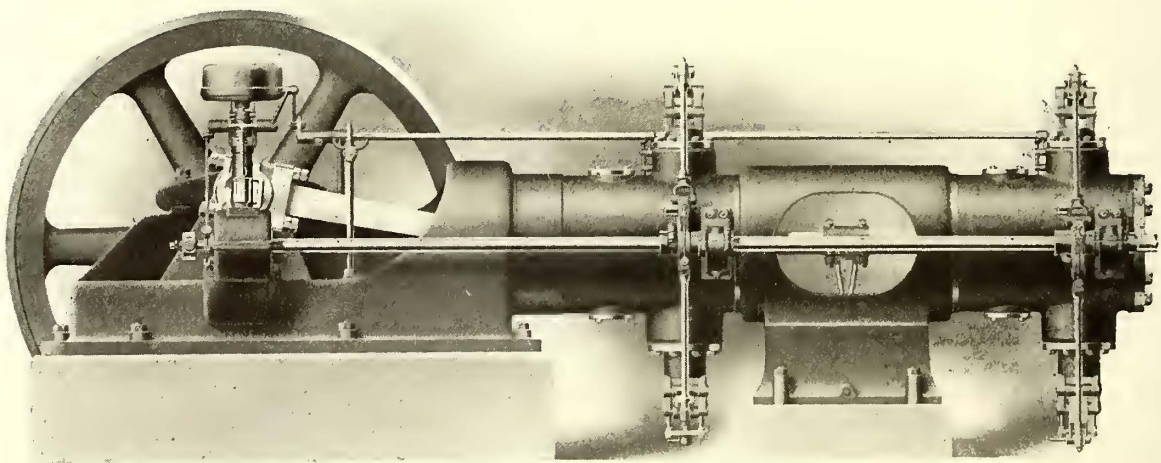
The larger cylinders are made in bolted halves, but those for small engines are single castings. The metal of the working barrel is continuous from end to end, but the water jacket has an opening entirely around the circumference to permit free expansion and contraction. The opening in the water jacket is closed water-tight by a cast-iron band drawn tightly around the cylinder. The band compensates for sliding without causing any strains in the structure. The water space is readily accessible for cleaning and in-

nut to connect the two sections of the piston rod. The tail rod crosshead also consists of a simple steel casting with one swivel shoe, and has the same adjustment as the other crossheads.

The pistons are floated in the cylinders—that is, are made appreciably smaller than the working barrel and are carried entirely by the crossheads to insure a uniform and circular bore of the working barrel indefinitely. The pistons are generally made in halves split at right angles to the axis of the piston rod, and clamped together to form a solid piece. On the double-acting tandem engines the piston rods are made in two sections and joined by the intermediate crosshead, which is clamped and threaded. Each piston rod is drilled through from end to end and is ground true on the outside.

All connecting rods are forged from open-hearth steel. In double-acting engines the rod is solid at both ends and has bronze boxes at the crosshead end with wedge take-up. At the crank-pin end the boxes are babbitted and provided with wedge adjustment. In single-acting engines the crosshead end is solid, but the crank-pin end in this case is of the marine type, with babbitted boxes.

The fantail crank disks are of solid steel, properly coun-



Four-Stroke Single-Acting Gas Engine

spection. The main frame is anchored while the rest of the machine is free to slide on fixed guides. To maintain perfect alignment this builder's engines are of the side-crank construction.

The bed plate is of the bored guide type. The main journal bearing is of the babbitted quarter box type, with convenient wedge adjustment. The crosshead is a steel casting, threaded to receive the piston rod. It is split and clamped on the rod by through bolts. The crosshead pin is straight and secured by heavy clamping bolts. The shoes are steel castings and have a swivel connection to the body of the crosshead and are adjusted for wear by eccentric bolts securely clamped after adjustment. On a horizontal engine with a comparatively long piston rod, supporting a heavy piston, it is inevitable that the rod should bend slightly in the form of a bow. Without swivel shoes in the crosshead this deflection tends to make the shoes bear on one end and causes heating of both slides and shoes. In this engine this does not take place, and no matter how much flexure there is in the piston rods the crosshead shoes have a full bearing. The intermediate crosshead has the same swivel shoe connection as the main crosshead and also serves as a clamping

terweighted to balance the weight of the reciprocating parts. The cylinder heads of the small engines are cast in one piece; on the large engines they are cast in two pieces. These castings are simple and have large water space for cooling purposes. The joint between the cylinder and the head is made by a copper strip swaged and fitted permanently to the head.

The exhaust valves are of the poppet type, water-cooled internally. Effective means are provided for oiling the valve stems continuously. Each pair of admission and exhaust valves is driven by a single eccentric clamped to the lay shaft. These eccentrics are turned spherically on the periphery and are adjusted by a clamped joint without shimming.

The lay shaft is in the horizontal plane passing through the center of the engine. It is driven by steel gears, one of which is mounted on a drag shaft rotated by the main crank-pin through a universal joint. This construction insures smooth running even if the main crank shaft and the drag shaft are not in perfect alignment. The drag shaft carries a bevel gear meshing with a pinion on the governor spindle. The box for these two sets of gears has automatic

lubrication. The drag crank serves for conveying oil to the main crank-pin.

The governor is mounted directly on the gear box between the lay shaft and the main crank, and being driven by the drag shaft instead of the lay shaft, it is not subjected to the torsional disturbance caused by valve operation. The construction allows any desired combination of length and diameter of spring. None of the spring tension is carried by the pivots which support the weights. This governor is of the high-speed type and very sensitive. It is provided with an oil dash-pot to insure proper stability under all conditions.

The piping is extremely simple and substantial. The gas pipes are inside the air pipes and both rise vertically from below and enter directly into the mixing valve body. In the circulating water double-acting tandem engines enters the rod through the intermediate crosshead. The stream then divides and leaves the rod at opposite ends, draining through slots in the bed and rear end stubs. Each cylinder, cylinder head, exhaust bonnet and exhaust valve has independent water circulation.

ELECTRICAL EQUIPMENT IN THE GARY PLANT OF THE INDIANA STEEL COMPANY

The new plant of the Indiana Steel Company at Gary, Ind., has the distinction of being operated entirely from waste blast-furnace gases. The plans call for 16 blast furnaces, eight of which are now completed or under construction. These furnaces produce about 44,900,000 cu. ft. of gas per 24 hours, equivalent, when used in gas engines, to 500,000 brake hp. Of this quantity approximately 30 per cent is taken for heating the stoves, 7½ per cent is diverted to steam boiler furnaces, 5 per cent is consumed by various auxiliaries or lost in the process of cleansing, 12½ per cent operates the gas-engine-driven blowers, and 45 per cent supplies the electrical power station.

The power station, which is 966 ft. long and 105 ft. wide, with 42 23-ft. bays, is located immediately adjacent to the blowing engine houses and between the blast and open-hearth furnaces. It contains 17 horizontal, twin-tandem, double-acting gas engines, running at 83 1/3 r.p.m., 15 designed for coupling to a.c. generators and two to be connected to d.c. generators. The former are 25-cycle, three-phase, 2300-volt machines, and the latter deliver current at a pressure of 250 volts. The engines have a rating of 4000 hp, and the generators of 2000 kw, but can carry continuously a 30 per cent overload. The 17 units were built complete by the Allis-Chalmers Company. The gas engines are said to be the largest in the world to operate on blast-furnace gas.

The engine frames weigh approximately 90 tons each, and one-half of each frame is buried in the foundation to raise the floor line to a point which will make the rods on the valve gear readily accessible. The floor space occupied by one engine is 70 ft. x 44 ft. The cylinders are 44 in. x 54 in. stroke, the crank pins are 20 in. diameter, the shaft is 30 in. diameter in the bearing, and the fly-wheel is 23 ft. diameter, weighing 200,000 lb. The pistons and rods are water-cooled independently.

The valve gear is of the builder's stratification type and the engine operates with constant compression to insure smooth running under highly variably loads. The igniters are electrically controlled and so arranged that the time of ignition may be regulated by a single hand-wheel. Direct current at 80 volts is used in the ignition system. Duplicate independent igniters are provided at each end of the

cylinder to insure prompt firing of low-heat-value gases and also to avoid the danger of shut down due to short-circuit.

The a.c. generators are of a type developed by the Allis-Chalmers Company for use with these engines. The d.c. generators have also been designed with particular regard to this service, but, in general, are similar to this company's standard engine type machines.

The Cutler-Hammer remote-control field rheostats and field switches for the generators are in the basement and are operated from the bench board in the power-house gallery. The rheostats are of the "cross-head" type. They are driven by vertical motors and have automatic devices which insure the stopping of the motor at either limit of the "cross-head" travel; that is to say, either when all resistance has been cut in or cut out of circuit. Means are provided also for operating these field rheostats by hand in case of damage to the motor.

The power generated will be used to operate the heavy induction-motor-driven rolls, the tilting and feed tables for the various passes, the hot saws, hot and cold pull-ups, hot rolls, transfer tables, straightening and drilling machines, cold saws, elevators, conveyors, pumps and a multitude of other devices. Several of the motors built by the General Electric Company for these works are rated at 6000 hp each, being designed for driving the rolls, and from this they range in size down to machines used to operate switches in the power house. The problems of control presented by the multitude of motors installed at this plant involved many interesting features, the solution of which was largely intrusted to the engineers of the Cutler-Hammer Manufacturing Company, of Milwaukee. The electrical system as a whole is subject to central control at a Western Electric switchboard operated from a gallery 16 ft. high.

There is also a storage-battery installation, furnished by the Electric Storage Battery Company, housed in a two-story building, 87 ft. long x 47 ft. wide, near the power station. The batteries will be kept charged as nearly as possible to their full capacity to assist in meeting demands for excessive energy made upon the gas-engine-driven generators. The control of the battery charge and discharge in respect to the 250-volt direct-current bus is effected by two motor-driven boosters which may be operated singly or in parallel, the field excitation being controlled by a carbon regulator with its solenoid in series with the total output of the d.c. generators. The fluctuations of load on the a.c. circuit are transmitted to the battery by a split-pole converter designed to hold the constant a.c. voltage while permitting a sufficient range of d.c. voltage to cause the battery to charge from or discharge into the a.c. circuit through the converter. The various motor-generator sets, converters, etc., comprising this regulating system may be started and stopped from the bench board in the switching gallery by Cutler-Hammer remote-control starting apparatus and the field strength of the various machines may be varied by means of remote-control rheostats. One of these remote-control starters used in connection with a motor-generator set, which is started from the a.c. end, is designed to carry 10,000 amp under maximum working load conditions. This is believed to be the largest remote-control starter ever built.

The rail mill is equipped with 12 sets or stands of roll trains, all operated at varying speeds by G. E. a.c. motors. The aggregate driving capacity is 24,000 hp. Although the motors are provided with flywheels and operate in one direction, provision is made for reversing in case of necessity.

There are 16 motor-driven rail straighteners built by the

Hilles & Jones Company, of Wilmington, Del. From the straighteners the rolls are transferred by the usual skids to motor-driven three-spindle vertical drill presses furnished by William Sellers & Company, of Philadelphia.

The principal machinery was built and installed by the United Engineering & Foundry Company, with the exception of that in the finishing department, which was erected by the Morgan Engineering Company. For the lifting tables and transfers Westinghouse motors are used.

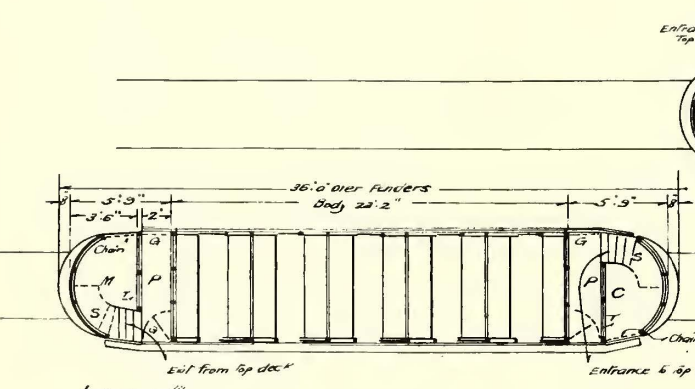
For the operation of cranes, tables and other apparatus, in and about the rail mill, requiring direct current, two 500-kw synchronous motors driving d.c. generators have been furnished by the General Electric Company. This equipment, with the necessary switchboards, is located in one of the motor houses at the rail mill and designated "Substation No. 1." Other substations suitably equipped are being located in other sections of the plant.

All of the machinery in the billet mill is electrically driven, General Electric, Crocker-Wheeler and Westinghouse motors being used. This machinery was also furnished by the United Engineering & Foundry Company.

SIDE ENTRANCE CARS IN NEW ZEALAND

In the discussions on easy access cars held so frequently in connection with rapid transit service, the Illinois Cen-

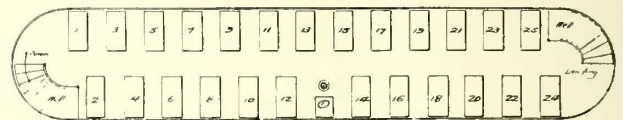
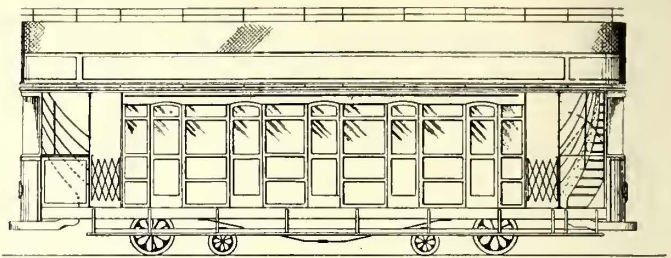
tral suburban car and the standard European steam railroad coach are often mentioned as the only designs in which multi-side-doors are used. It is interesting to learn that the multi-side-entrance car has been adopted for electric railway service in Wellington, N. Z., probably the only place in the world where it is used in ordinary street railway operation.



Entrance and Exit Arrangement for Upper-Deck Passengers of Multi-Side-Door Car

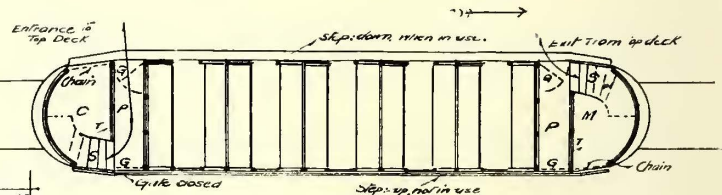
The single-deck cars of this type in Wellington are similar to the European type of steam railroad coach, in which the compartments extend all the way through the car. The body length is 28 ft. 5 in. and the benches or seats are set back to back. The car has six compartments, or 12 benches, or a seating capacity for 60 passengers. The knee room is 2 ft. A smoking compartment is provided at one end of the single-deck car and is separated from the main body by glass screens, which are carried up from the seat backs. The doors are hung outside by means of rollers at the top and are opened independently either by the passenger or the conductor.

The lower deck of the double-deck car is very similar in arrangement to that employed in the single-deck car, except that the body is 23 ft. 2 in. over all. This provides a 2-ft. passage at each end of the car to give access to a stairway at each end to the upper deck. Passengers ascend to the upper deck from the rear platform and leave



Double-Deck Multi-Side-Door Car

the front of the car, the safest position while the car is being braked. In addition, the sides of the stairways are enclosed with railings to prevent accident. The double-deck car has a capacity of 50 passengers inside and 51 outside,

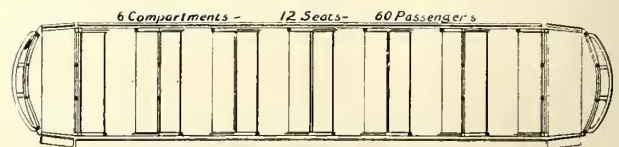
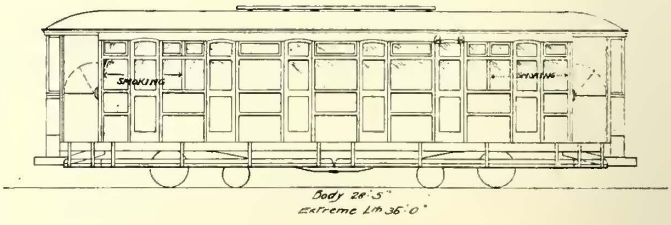


Reference.

M	Motorman
C	Conductor
G	Folding gates.
P	Passage
S	Stair.
T	Screen.

or 101 seats for a car 34 ft. 8 in. over all. The climate in Wellington is such that double-deck cars can be operated all the year round.

The cars are mounted on Brill maximum traction trucks.



Single-Deck Multi-Side-Door Car

and are equipped with GE 67 motors and B 18 controllers. This paper is indebted to Stuart Richardson, tramways and electrical engineer of the Wellington Corporation, for the information given of these cars.

ELECTRIC RAILWAY LEGAL DECISIONS

CHARTERS, FRANCHISES AND ORDINANCES

California.—Street Railroads—Franchise—Use of Streets—Nature of Right—Street Railroads—Sale of Franchise—Validity and Effect—Estoppel of Purchaser—Conveyance of Franchise—Recitals—Trial—Reception of Evidence—Sufficiency of Offer—Street Railroads—Franchises—Sale of Franchise—Consent of State—Necessity—Validity—Public Policy—Sale of Franchise—Issuance of Corporate Bonds to Pay Purchase Price.

The right to use the streets of a city as a way upon which to operate a street railroad is a right in real property, an incorporeal hereditament.

Plaintiff transferred to defendant by deed all of his interest in certain franchises for the building of a street railroad, which had been granted to him, the deed containing no covenants of title or seisin, and no fraud or mistake was alleged in making the sale. Held, that the deed transferred, not merely the paper under which plaintiff claimed, but was a transfer of an interest in real property, and amounted to a quitclaim deed; and hence the fact that plaintiff had no title to the franchise sold was not a defense in an action for the purchase price, and evidence that the original grant of the franchise to plaintiff was invalid was properly rejected.

Where plaintiff transferred to defendant certain franchises for a street railroad, the conveyance reciting that the franchise was "duly given" by the City Council, such recital was merely a description of the thing granted; and, while it might constitute an estoppel against the grantors, it did not amount to an express agreement or covenant that plaintiff had good title to the franchise conveyed.

In an action for the purchase price of certain franchises transferred by plaintiff to defendant, an offer by defendant to show that the franchises were wholly void, and were defective under the laws of the State wherein they were granted, cannot be construed as an offer to prove that the laws of such State did not permit the transfer of a franchise without the consent of the State.

Civ. Code, Section 510, provides that street railways are governed by the provisions of title 3, in so far as they are applicable, unless such railroads are specially excepted. Section 511 provides that, when a street railway is constructed, owned, or operated by a natural person, this title is applicable to such person, as well as to corporations. Section 494 of title 3 provides that any railroad corporation or person owning any railroad in this State may transfer its franchise to any other railroad corporation, whether organized within or without this State, and the transferee may operate the franchise property within the State and exercise all the rights of a domestic corporation. Held, that a street railroad franchise may be transferred in this State, whether held by a corporation or natural person, and the formal or express consent of the State is not necessary.

Where plaintiff transferred to defendant franchises for a street railroad, defendant agreeing to form a corporation, to build and operate a street railroad, and to cause corporate bonds to be issued to plaintiff in payment for the franchise, such agreement to issue bonds and to construct the road was not contrary to public policy, and was a legitimate and valid undertaking.—(O'Sullivan v. Griffith, 95 Pac Rep., 873.)

Georgia.—Carriers—Street Railroads—Refusal of Transfer—Damages.

A plaintiff, who was wrongfully left by a street car company upon a public street in violation of a claimed right of transfer to a particular car, and who thereupon walked a considerable distance to her home, wherefrom she was made ill, cannot recover damages on account of such illness, where it appears that another street car within a few minutes would have been available for the purpose of the journey, and no reason appears why she should not have waited therefor, or why she should have undertaken the walk. In such a case the illness and consequent suffering will be regarded as the result of her voluntary act, and not of the company's wrong.—(Williams v. Rome Ry. & Light Co., 61 S. E. Rep., 495.)

Illinois.—Street Railroads—Franchises—Contract—Modification—Municipal Corporations—Ordinances—Amendment—Contracts—License to Use Streets—Necessity of Ordinance—Street Railroads—Grant of Rights in Streets—"Local Authorities"—"Corporate Authorities"—Municipal Corporations—Governmental Powers—Granting Licenses—Street Railroads—Grant of Rights in Streets—Contracts—Validity—Estoppel to Deny.

Where an ordinance granted a right to construct a street railroad on certain streets and avenues of a city, and provided that the railroad company should be liable for, and

pay into the city treasury, \$50, and no more, as an annual license fee for each and every car used by the company, a contract executed by the corporation and the Mayor on behalf of the city, to induce the Mayor to sign the ordinance, providing that the railway company should pay \$50,000 in installments within 20 years for the right secured, constituted such a modification or amendment of the ordinance that both could not be executed as a whole.

Under Chicago City charter, providing that an ordinance must be agreed to by the concurrence of a majority of all the members of a City Council elect, and that the yeas and nays must be taken, and a rule that a city ordinance can only be amended or repealed by an act of equal dignity and formality, and not by a mere resolution, a contract between a street railway company and the Mayor acting on the city's behalf, by which the railway company agreed to pay the city \$50,000 to induce the Mayor to sign a franchise ordinance, which contract was informally accepted by the City Council and ordered filed, was ineffective as an amendment of the ordinance.

Illinois Constitution 1870, article 11, section 4, prohibits any law granting a right to construct a street railroad within a city without requiring the consent of the local authorities. Held that, though the right to construct a street railroad comes from the State as a "franchise," and the consent and designation of streets to be occupied comes from the municipality as a "license" or contract right, such license must be by ordinance of the City Council passed by the yeas and nays concurred in by the majority of the members elect and approved by the Mayor under the city's charter, providing that ordinances must be so adopted.

Illinois Constitution 1870, article 11, section 4, prohibits the granting of a right to construct a street railroad in a street without the consent of the "local authorities" and street railway act requires the consent of the "corporate authorities." Held, that the terms "local authorities" and "corporate authorities" were synonymous, and used to indicate those representatives either directly elected by the people or appointed in some mode to which the people had given their assent.

The granting of licenses to a street railway company to construct a street railway in a street by a city is the exercise of governmental power, in which the municipality acts as the agent or representative of the State, and not in a private capacity.

Where a street railway company, in order to induce the Mayor of a city to sign a franchise ordinance, executed a contract which was void in its inception, by which the railway company agreed to pay the city \$50,000 in installments for the rights granted under the franchise, and after executing the contract the railway company proceeded to construct and operate its road on one of the streets under a permit issued by the commissioner of public works pursuant to such franchise and contract, the railway company was thereafter estopped to deny that the contract was valid.—(Potter v. Calumet Electric St. Ry. Co. et al. City of Chicago v. Cole, 158 Fed. Rep., 521.)

Illinois.—Eminent Domain—Remedies of Property Owners—Rights in Street—Injunction—Persons Entitled to Sue.

The owner of a lot abutting on a street, with title in fee extending to the center of the street, subject only to the easement for street purposes, under the law of Illinois may maintain a suit in equity to enjoin a corporation from appropriating and using the street for railroad purposes, and the question whether the corporation is one to which the State statute has delegated the power to make such appropriation by condemnation proceedings may be raised and determined in such suit.—(Greene v. Aurora Rys. Co., 157 Fed. Rep., 85.)

Indiana.—Street Railroads—Consolidation—Right to Consolidate—De Facto Consolidation—Rights of Consolidated Company—Eminent Domain—Street Railways—Right to Cross Railway—Additional Servitude.

Where the consolidation of domestic street and interurban railway corporations with similar foreign corporations is authorized by law, and an alleged consolidated company made a bona fide attempt to organize under the law, and actually exercised corporate functions, the fact that the domestic corporation, which attempted to enter the consolidation, did not have any railway constructed and in operation, as contemplated by Laws 1901, p. 181, c. 94, authorizing consolidation, would not prevent the consolidated corporation from being a de facto corporation.

Under Burns' Ann. St. 1901, Section 5468j, relating to powers of consolidated street railways, providing that nothing therein contained shall be construed to abridge any power, privilege, or franchise to them belonging by their respective acts of incorporation, etc., in an action to enjoin interference with a plaintiff railway, it must be assumed that

a de facto consolidated street and interurban railway is entitled to the rights and privileges of a domestic street and interurban railway.

An interurban railway has the right to cross the tracks of a railway company in a street of a town through which it has a franchise, since the construction of such interurban railway is not an additional servitude.—(Cleveland, C., C. & St. L. Ry. Co. v. Feight et al., 84 N. E. Rep, 15.)

LIABILITY FOR NEGLIGENCE

Alabama. — Instructions — Street Railroads — Contributory Negligence—Infants—Failure to Stop, Look, and Listen—Trial—Unintelligible Instructions—Propriety of Refusal—Misleading Instructions—Station Tracks—Duty—Evidence—Contributory Negligence—Question for Jury—Misleading Instructions—Passing Cars—Company's Duty—Passengers—Action for Personal Injury—Instructions—Misleading Instructions—Wanton Negligence—Speed of Cars.

In an action against a street railway company an instruction that if, when plaintiff was injured, he had sufficient age, judgment and discretion to know the danger of going on the track without stopping and looking for approaching cars he could not recover, was properly refused, as ignoring the question whether his act proximately contributed to his injury.

The liability of an eleven-year-old child for contributory negligence cannot be based upon the sole fact that he had sufficient age and discretion to know the danger of going upon a street railway track without stopping, looking, or listening for approaching cars, since it is not the ability to appreciate danger which might make a child between 7 and 14 years of age responsible for contributory negligence, but it must be a maturity and discretion beyond its years which would lead it to take care.

In a personal injury action against a street railway, an instruction that under certain circumstances the "just" must find that the plaintiff was not entitled, etc., was properly refused as unintelligible.

In a personal injury action an instruction implying that plaintiff did not listen for approaching cars before going upon defendant's track was properly refused, where plaintiff's testimony tended to show he did listen.

A carrier owes a duty to passengers alighting at a regular station that while making their egress they be not struck by other cars, and, though a passenger must exercise care for his safety, he may assume that the tracks between the alighting place and the station will be kept safe while he is crossing; and hence the mere fact that he fails to look and listen for approaching cars before attempting to cross will not as a matter of law constitute contributory negligence, preventing a recovery if he is struck by such a car.

In an action against a street railway company for injury to an alighting passenger, injured while crossing a track, that the car which struck him was running from six to ten miles an hour and ran two or three car lengths after striking him may be considered on the question of the company's negligence.

In an action against a street railway company for injury to an alighting passenger injured while crossing a track, whether he was guilty of contributory negligence held, under the evidence, a question for the jury.

In an action against a street railway company for injury to an alighting passenger, struck by a passing car while attempting to cross a track, an instruction that the motorman on such car was not bound to give signals, except when passing or about to pass another car, was properly refused as tending to mislead the jury, where the evidence showed that plaintiff was injured at a station where the car from which he alighted stopped, or so near the station as not to have relieved the motorman of the duty of giving signals of the approach of the car that injured plaintiff.

A street railway company may not excuse its motorman's negligence in failing to give signals or to reduce the speed of his car, resulting in injury to one attempting to cross the track behind another car, on the ground that it was not the custom to give such signals or to reduce the speed when approaching and passing cars.

In an action for injury to one alighting from a street car and struck by a passing car while attempting to cross tracks behind the car from which he alighted, an instruction that if he alighted before the car reached his station and while it was in motion he could not recover was properly refused, since under it he could not recover, though he alighted just before the car stopped and while it was moving very slowly.

In an action for injury to one alighting from one street car and struck by another while attempting to cross tracks behind the car from which he alighted, an instruction that if plaintiff alighted before his car reached the regular stopping place, and if a custom to give warning signals

when passing a standing car and to reduce speed or stop opposite the standing car existed when plaintiff was hurt and was for the benefit altogether of passengers alighting from the standing car, and if plaintiff alighted at such point to escape paying fare, then he was not entitled to complain of any violation of such custom, was properly refused, as being involved and misleading.

It was wantonly negligent for a motorman to run his car at a high rate of speed on entering a station and passing another car on an adjoining track, which had stopped or was stopping to discharge passengers.—(Birmingham Ry., Light & Power Co. v. Landrum, 45 S. Rep., 198.)

Alabama.—Carriers—Injury to Passengers—Negligence—Wantonness—Pleading — Contributory Negligence — Wantonness—Evidence—Boarding Moving Car—Contributory Negligence—Taking Up Passengers—Negligence of Motorman—Instructions.

A count of a complaint, alleging that defendant's servant "wantonly and recklessly or intentionally" injured plaintiff, will be held a charge of wantonness and intentional injury.

A plea setting up contributory negligence, for that "plaintiff negligently boarded or negligently attempted to board said car," is demurrable as too general, because not setting out the manner in which he boarded or attempted to board it.

On the issue of willfulness or wantonness in the injury to plaintiff by the starting of defendant's street car, the evidence tending to show that plaintiff was in the act of boarding the car, that the motorman saw or could with diligence have seen him in such an attempt when the car was started, and that the motorman was notified of plaintiff's physical infirmity and his consequent slowness of gait, and was requested by plaintiff's son not to start the car till plaintiff got on, testimony of the motorman that it was the motorman's duty to see that every one ready to get on the car got on before he started was admissible.

It is not always negligence to get on a moving street car, and whether in a particular instance it is, considering the speed of the car and other circumstances, is generally a question for the jury.

The motorman has not done his full duty by ascertaining before he starts the car that no one is in the act of getting on the "platform or steps;" but if a passenger is getting on the car, though simply having hold of the handles thereof, it is his duty not to start.

The crew of a street car, or some of them, being chargeable with the duty of knowing before starting that no one was in the act of boarding or attempting to board the car, defendant street railway company is not entitled to a charge that, if plaintiff attempted to board its car after it had started and without the knowledge of the crew, he could not recover, as their failure to know that he was in the act of getting on might be negligence.—(Birmingham Ry., Light & Power Co. v. Lee, 45 S. Rep., 292.)

Alabama.—Street Railroads — Operation — Personal Injuries—Wanton Injury—Pleading.

A count in a complaint against a street railroad company for personal injuries, alleging that defendant's car was recklessly and wantonly propelled, and while being so propelled was run over plaintiff, mangling and wounding him, while bad as a count for wanton injury, there being no averment that the injury was wantonly inflicted and no averment of conscious knowledge that the wantonness would probably result in the injury, or of a state of facts from which such knowledge might be reasonably inferred, is sufficient as a count for simple negligence, and as such is open to the defense of contributory negligence.

A count in a complaint against a street railroad company for personal injuries, alleging that the car which struck plaintiff was being operated at the usual rate of speed in a populous portion of the city, and that the motorman was wantonly and recklessly running the car without looking ahead, and at the time of the accident was looking towards the rear of the car, while bad as a count for wanton injury, there being no averment of conscious knowledge on the part of the motorman that his failure to look ahead would probably result in injury, is sufficient as a count for simple negligence, and as such is open to the defense of contributory negligence.

A count in a complaint against a street railroad company for personal injuries, which contains a general averment of willfulness and then alleges facts showing a negligent omission of duty in keeping a proper lookout, but fails to show conscious knowledge that such omission of duty would probably result in the injuries, is bad as a count for wanton injury, since the facts on which the willfulness and wantonness are predicated control the general averment, and such facts are nothing more than a count in simple negligence.

Where a count in a complaint against a street railroad company for personal injuries alleged that the injury was wantonly inflicted, but did not state the facts in which the wantonness consisted, a plea of contributory negligence was no defense, and a demurrer to such plea was properly sustained.—(Birmingham Ry., Light & Power Co. v. Jaffee, 45 S. Rep., 469.)

Kentucky.—Street Railroads—Injury to Person Near Track—Right of Way Over Tracks—Instructions.

While plaintiff was at his horse's head attempting to back the wagon to the curbing for the purpose of unloading goods on the pavement one of defendant's cars, propelled at a high rate of speed, without sounding a gong or giving warning, struck him. It was sufficiently light for the motorman to see plaintiff and the wagon, and to realize his dangerous position. Held, that the defendant was liable.

Where plaintiff, while at his horse's head attempting to back the wagon to the curbing to unload goods, was struck by a passing street car, plaintiff was lawfully on the street, and had the right to use any part of it, subject to defendant's superior right of way. Defendant was entitled to the use of its tracks; but it was the duty of those in charge of the car to keep a lookout for persons on or near the track, and exercise ordinary care to avoid injuring them.

In an action against a street railway, the court instructed that, if while plaintiff was on the street the motorman and employees in charge of the car knew, or by ordinary care could have known, of his presence in time to stop said car and avoid injuring him, and while plaintiff was in the exercise of ordinary care said car was run against him to his injury, to find for plaintiff. Held, that the instruction was not subject to the objection that it did not base defendant's liability on the discovery of plaintiff's peril or negligent failure to discover his peril, but told the jury that, if plaintiff was on the track or sufficiently near to be struck, and his presence was known or could have been, etc., defendant was liable.—(South Covington & C. St. Ry. Co. v. Eichler, 108 S. W. Rep., 329.)

Louisiana.—Carriers—Carriage of Passengers—Taking up Passengers—Personal Injury Case—Signaling Car to Stop—Place of Signal—The Moving Train—Contributory Negligence—Boarding Moving Car—Assuming Risks—Getting on Trailer—Slowing Down—Motorman and Conductor.

Plaintiff sought to get aboard of one of defendant's West End trains, made up of a motor car and trailer. In the attempt, he was thrown down, bruised and wounded.

A person who gives the signal to the motorman to stop should stand at or reasonably near the place at which it is usual to stand in order to hail the car.

The motorman and conductor are not held to the necessity of seeing with the view of stopping for those who give the signal while the train is running.

It is not negligence to board the car while it is in motion. Those who do it assume some risks which must be taken into account if an accident happens.

There is greater danger in getting on a trailer of a train than on the cars in front; at the moment that the rate of speed is increased it (the trailer) oscillates from one side to the other, and has a backward and forward motion that renders it more difficult for the one attempting to board to hold on. It is a dead weight, and its movements are not generally as regular as those of the motor car to which it is attached.

The train slowed down as usual at one of the large avenues. The act of the passenger in getting on at this time is not considered in the same light as if the attempt had been made at the crossing where the car stops when hailed.

The testimony does not show that the motorman or the conductor saw the plaintiff at the time that he made the attempt to get on. Had it been at the stopping place it would have been different, for then it would have been an important duty to see the passenger when he hailed, and when he attempted to get on.—(Pitard v. New Orleans Ry. & Light Co., 45 S. Rep., 943.)

Massachusetts.—Master and Servant—Injuries to Servant—Questions for Jury—Instructions—Negligence of Master.

In an action for injuries to a street railway employee caused by the absence of a step on the car he was using, held that, under the evidence, the questions as to how far he was justified in relying on the promise of the superintendent to have the step repaired, how far the risk was to be regarded as an obvious one and as having been assumed by him, and whether he should have looked, if he did not, before attempting to alight, and whether, if he had looked, he could have failed to notice the absence of the step, were questions for the jury.

In an action for injuries to a street railway employee

caused by the absence of a step on a car, where it appeared that the superintendent, on his attention being called to the absence of the step by plaintiff, promised to have it replaced at once, an instruction that if plaintiff knew that the step was gone from the car, but forgot it at the time, he was not in the exercise of due care and could not recover, but, if he supposed on reason that the steps were there because of the superintendent's promise to replace them and his reliance thereon, it was then a question of fact for the jury whether at the time he got off he looked to see in such a way as a reasonably prudent man would do, was not subject to exception by defendant.

In an action for injuries to a street railway employee due to the absence of a step on a car, held that, under the evidence, whether plaintiff were negligent in attempting to alight from the car while in motion or at a place where the road was banked with snow were questions for the jury.

The act of a street railway company in allowing a step on its work car to remain off, when it knew that the car would be used by its employees, constituted negligence.—(Flynn v. Connecticut Valley St. Ry. Co., 82 N. E. Rep., 1085.)

Michigan.—Evidence—Hearsay Evidence—Res Gestæ—Carriers—Carriage of Passengers—Personal Injuries—Care Required of Carriers—Street Railroads—Defective Brakes—Questions for Jury—Inspection of Brakes—Degree of Care Required—Reliance on Air Brakes—Questions for Jury.

In an action against a street railway for injuries to a passenger in a collision between a passenger car and a freight car, evidence of statements by the motorman of the freight car 18 hours before the accident and at a place 5 miles therefrom, that his car had not been working and that he had so reported it, was inadmissible as hearsay and not part of the res gestæ.

Common carriers of passengers, which run freight cars only a short distance after passenger cars, and up and down steep inclines, must exercise a very high degree of care to have their appliances in proper condition and properly managed, and on the first indication of wearing out or of defects of any character it is their duty to inspect them and see that they are in good condition.

In an action against a street railway for injuries to plaintiff, a passenger, in a collision between a freight car and a passenger car, evidence held sufficient to go to the jury on the question whether the brakes on the freight car were defective.

Where a street railway relies on an inspection of brakes as a defense to an action for injuries to a passenger, in a collision caused by alleged defective brakes, the inspection must be shown to be as thorough as the dangers incident to the business make necessary.

In an action against a street railway for injuries to plaintiff, a passenger, in a collision between a passenger car and a heavily loaded freight car, whether the motorman of the freight car was negligent in starting down a steep incline at the rate of 15 miles an hour, knowing that the passenger car was at the foot of the incline, and relying on air brakes alone to check the speed of his car, was a question for the jury.

In an action against a street railway for injuries to a passenger by a collision between a passenger car and a heavily loaded freight car, it appeared that, after starting down a steep incline at the bottom of which the passenger car was waiting, the motorman on defendant's freight car endeavored to apply the air brakes; that, finding that they would not work, he made several subsequent attempts before reversing the current; and that, after finding that the reverse did not work, he failed to try the hand brake on the car. Held, that whether the motorman was negligent or not was a question for the jury.—(Rouston v. Detroit United Ry., 115 N. W. Rep., 62.)

Minnesota.—Street Railroads—Injuries to Pedestrian—Contributory Negligence.

The evidence sustains a finding of the jury that proper signals were not given, and that appellant's repair car was not under proper control as it approached the street which respondent was crossing.

The evidence does not conclusively show that respondent's intestate, while riding a bicycle, was guilty of contributory negligence in attempting to cross the street car tracks ahead of the car.—(Youngquist v. Minneapolis St. Ry. Co., 114 N. W. Rep., 259.)

New York.—Carriers—Injuries to Passengers—Proximate Cause—Evidence.

A finding that the starting of a car while a passenger was alighting therefrom was the proximate cause of an injury to him held warranted under the evidence.

Where, in an action against a street railway company for

injuries to a passenger, there was no evidence that the company required reports of accidents, or that it was customary for employees to make reports, and the company proved that there was no paper connected with the accident on file, except a synopsis of the complaint made after service, the exclusion of evidence that no report of the accident was on the files of the company was not prejudicial.—(Randazzo vs. Brooklyn Heights R. Co., 106 N. Y. Sup., 193.)

New York.—Street Railways—Injuries from Collision—Contributory Negligence—Sufficiency of Evidence—Right of Way Over Tracks.

Plaintiff was struck by a street car while unloading a wagon, the hub thereof being about 6 inches outside the track of the street railway. The car tracks were double, and cars came from one direction only on the track nearest the wagon, and could be seen for 300 feet before reaching that point. Plaintiff knew the tracks were there, but did not look in either direction, nor did he ask the foreman or driver to keep a lookout for him, but he stood on the hub nearest the track at work for 5 or 10 minutes immediately preceding the accident. The wagon had been there for 15 minutes, but no car had passed during that period. Plaintiff stood with his back directly toward the track, and was simply required to look sideways to see the approaching car. Held that, as plaintiff used no care, he was guilty of contributory negligence as matter of law, and could not recover.

The right to stop a wagon, for the purpose of unloading, near a street railway track, is subordinate to the right of way of the railroad company. It is the duty of a person so unloading a wagon to get out of the way to allow a car to pass, and the duty of the motorman to approach carefully, with his car under control, so that he can stop promptly to prevent an accident. Each has the right to assume that the other will do his duty, but neither has the right to so act that, if the other does not do his duty, a collision will follow.—(Volosko v. Interurban St. Ry. Co., 82 N. E. Rep., 1090.)

Texas.—Carriers—Injury to Passenger—Contributory Negligence—Instructions—Trial—Instructions—Province of Jury—Weight of Evidence—Requested Instructions—Necessity of Request—Evidence—Opinions—Facts or Opinions.

Where the only negligence alleged is the sudden starting of the car before plaintiff could alight, and a witness testified that plaintiff "did not start to get off the car until the conductor had started the car," the refusal to instruct that plaintiff could not recover if he attempted to alight while the car was in motion is error.

If a street car conductor knew or had reason to believe that plaintiff was about to alight, and with such knowledge permitted the car to be started so as to cause plaintiff while alighting to be thrown down and injured, the company is liable for the injury if plaintiff was free from fault contributing to the injury.

In an action for injuries to a passenger in alighting from a street car, a charge that "plaintiff, as shown by the evidence, was a passenger on the car of defendant at the time and place of the alleged injuries, and in law he continued to be a passenger until he had a reasonable time under all circumstances shown by the evidence in which to alight," is erroneous as on the weight of the evidence in telling the jury that plaintiff was a passenger at the time and place of the injury.

Though the burden of proof is on plaintiff in an action for injuries to a passenger in alighting from a street car, it is not error to charge the jury that if it "believed defendant was not guilty of negligence in starting the car as it was started to find for defendant," in the absence of a request from defendant for an instruction stating the case affirmatively from its point of view.

In an action for injuries to plaintiff in alighting from a street car, a witness testified that plaintiff "was standing talking to us when the car started; just as it started he said, 'Wait,' but the conductor could not hear him, and then he started to get off." Held, that it was error to strike out the words "but the conductor could not hear him," because from the position of the parties the witness could tell from observation whether plaintiff was heard by the conductor or not.—(El Paso Electric Ry. Co. v. Boer, 108 S. W. Rep., 199.)

Texas.—Carriers—Injury to Passenger—Trial—Instructions—Province of Court and Jury—Applicability to Pleading and Evidence—Application of Instructions to Case—Pleading and Issues—Injuries to Passenger—Instructions—Misleading Instructions—Setting Down Passengers—Instructions.

In an action for injuries received while getting off defendant's street car at a certain building, the conductor not having been notified that plaintiff wished to alight at that point, which was not a regular stopping place, the car having stopped there only for the purpose of throwing a switch, a charge that if the con-

ductor failed to exercise such care as a very cautious, etc., person would have exercised under like circumstances to see that no one attempted to alight from the car when it started, such failure would be negligence, was erroneous, as stating, in effect, that such was the conductor's duty as a cautious person, instead of leaving that question for the jury.

In an action to recover for injuries, medical expenses, and loss by impairment of earning power resulting from injuries received while alighting from defendant's street car, where the evidence showed that the injuries received, and the loss resulting therefrom, were greater than the sums alleged in the petition, it was error to charge that plaintiff was entitled to recover for the injuries received, etc., loss of earning power, and medical expenses, etc., as, in the light of the testimony, would reasonably compensate her therefor, since her recovery should have been limited to the amounts claimed in the petition.

In an action for injuries received while alighting from defendant's street car, a charge that, if the jury found that the place where defendant's car stopped and plaintiff attempted to alight was not the usual place to alight, the conductor should have used the same care in avoiding injuring passengers by starting the car which he should have used had the place been a usual stopping place, having been fully given in the prior charge, its repetition gave undue prominence to the question, and was error.

The charge was also misleading as tending to lead the jury to believe that the conductor owed plaintiff the same degree of care in starting the car under all circumstances.

What would constitute a high degree of care in starting a street car stopped to turn a switch where passengers were not expected to alight might not constitute such a degree of care in starting a car stopped at a place for passengers to get aboard and alight, the amount of the diligence required depending on the hazard involved.

In an action for injuries received while alighting from defendant's street car, a charge that, if defendant's employees exercised a high degree of care for plaintiff's safety which a very cautious, prudent, and careful person would have exercised under such circumstances, plaintiff could recover, was properly refused, since the degree of care required is that which a cautious, prudent, and "competent" person would have used.—(Rapid Transit Ry. Co. v. Strong, 108 S. W. Rep., 394.)

Washington.—Carriers—Injury to Passengers—Care by Motormen—Instructions.

An instruction, in an action against a carrier for injury to a passenger, which after asserting that, if defendant's motorman exercised the highest degree of care to avoid the accident which was reasonably practicable under the circumstances, this was enough, states that by the term "highest degree of care" is meant that degree of care which would be exercised under like circumstances by very careful, prudent and experienced conductors and motormen generally, does not require too much by the use of the word "very."

Where the complaint, in an action against an electric railway company, for injury to a passenger by collision of two cars, simply charges in general terms that defendant, and its agents and servants, so carelessly and negligently operated the cars that they come together in head-on collision, and that by the exercise of proper care the collision could have been avoided, and the fact of collision was admitted, and defendant introduced evidence bearing on the acts and limitations of the two motormen under the circumstances, it was not error to place on defendant the imputation of negligence, based on its admission of a collision, by an instruction that if the jury found the motorman of either car failed to exercise the judgment, care, caution and skill necessary under the circumstances, and failed to exercise the care, judgment, caution and skill usually and customarily attendant in like conditions and circumstances, then defendant had failed to overcome the imputation of negligence in operating the cars, arising in case of such collision.

Plaintiff, in a personal injury case, cannot be said to have been guilty of misconduct because, near the close of the argument for defendant, she burst out crying and trembling, and was suddenly taken out of the room, in view of the jury, by those who were with her; she having been engaged in a long trial, the evidence tending to show she was very nervous as the result of her injuries, the argument having been in progress for an hour, and it not being an unreasonable inference, based on the evidence, that the argument may have involved criticism of her to such an extent that, as a nervous woman, she was unavoidably overcome in such manner.

A verdict of \$3,500 cannot be said to be excessive, where plaintiff, who for years had worked and earned her living, and at the time of her injury was employed in a store in the alteration of ladies' tailor-made gowns, was so bruised about her side and injured about her ribs and spine that she has since been unable to follow any vocation.—(Connell vs. Seattle R. & S. Co., 92 Pac. Rep., 377.)

LONDON LETTER

(FROM OUR REGULAR CORRESPONDENT)

The seventh annual conference of the Municipal Tramways Association, of which J. Aldworth, general manager of the Nottingham Tramways, is president, was held during September in Nottingham. After Mr. Aldworth delivered his presidential address, H. E. Blain, general manager of the West Ham Corporation Tramways, read a paper, entitled "Some Through Running Problems and Their Solution." Luncheon was tendered to the delegates by the Nottingham Corporation Tramways Committee, and after luncheon the members and their friends inspected the Trent Bridge car repairing works and the St. Ann's Well Road generating station. In the evening a reception was held at the Art Museum, Nottingham Castle, by the Mayor of Nottingham and the chairman and vice-chairman of the Nottingham Tramways Committee. The following day H. Linsley, chairman of the Salford Corporation Tramways, presented a paper on the "Treatment of Corporation Employees Incapable of Performing Ordinary Duty," and R. H. Cunliffe, M.Sc.Tech., and J. G. Cunliffe, M.Sc.Tech., assistant electrical engineers to the Manchester Corporation Tramways, presented a paper on the "Application of Technical Science to the Construction, Maintenance and Operation of Tramways." After luncheon L. Mackinnon, traffic superintendent of the Glasgow Corporation Tramways, presented a paper on "Ticket Check." The annual dinner of the association, held in the evening, was well attended. The last day, as usual, was devoted to pleasure, a special train leaving Nottingham for Bottesford, where special conveyances were in waiting to convey the party to Belvoir Castle, one of the castles of His Grace the Duke of Rutland, who arranged to admit the party to the castle and grounds.

The highways committee of the London County Council has recommended that body to ask Parliament for authority to construct various short tramway lines intended to connect isolated sections of the system, to extend the lines to districts inadequately served, and to facilitate the electrification of routes still operated by horses. The total cost involved is estimated at more than £700,000, though the expense for any single extension does not exceed £60,000. In London there is only about 1 mile of tramway to every 20,000 inhabitants, while in Manchester there is 1 mile to every 3,000, in Glasgow 1 mile to every 5,000, and in New York there is 1 mile to every 2,500. The surface contact system on the Mile End Road has not yet been placed in operation, and W. M. Mordey has been engaged as an expert to examine the system. In the meantime horse cars are still operating over the portion of the line equipped with the G.B. system.

While on the subject of London tramways it may not be amiss to point out the sad condition of the bus companies in London, more particularly the London General Omnibus Company, which is the largest operating company in London. This company has about a thousand horse buses in London and a large number of motor buses. So keen, however, is the competition between it and the other companies operating motor buses only, that the report for the year ending June 30 shows a loss of nearly £130,000, there being a decrease of more than £48,000 in the gross receipts, while the expenses have increased to £41,000, owing doubtless to the motor bus experiments. The London General Omnibus Company, however, recently amalgamated with the Vanguard Company, which operates motor buses only, and it is hoped that gradually the condition will improve, as ruinous competition will be eliminated. It is also interesting to note that the tramway business throughout the United Kingdom is not as good this year as it has been in previous years. Mr. Nance, the general manager of the Belfast system, who recently collected information from a number of companies in Great Britain regarding their earnings, notes a decided falling off this year, which is attributed to the decrease in trade in Great Britain and to the Franco-British Exhibition, which has withdrawn a large amount of local traffic.

The Court of Sessions, Edinburgh, before which the Edinburgh Tramways Company was sued by the parents of a boy who had been killed while crossing the street, has recently rendered an interesting decision. The boy crossed the street from the left-hand side, and it was contended that the practice of having reverse staircases on the Edinburgh cars prevented the driver from seeing the boy. The judge pointed out, however, that Edinburgh had had reverse staircases for about 17 years during which time no accident had been caused by them, and at a speed of 9 miles an hour the total length of time during which the boy would be invisible to the driver on account of the staircase would be less than half a second. The court held that the com-

pany was in no way responsible for the injury of the boy.

Last month it was mentioned in this letter that Liverpool had decided not to allow the blind to ride free on its tramways. The Dundee Town Council, on the other hand, has agreed that persons afflicted by blindness shall be allowed free use of the corporation tramcars. Previously the free passage of officials was not even looked upon favorably by the Council. Tickets are to be issued to the blind on the application of householders, but the corporation is to be exempt from any claim for accident on the part of the holder of a pass.

The question of the origin of the word "tramway" has been revived by the closing for traffic after 113 years of service of one of the earliest of the old "Outram-ways," which has been in operation at Little Eaton, a town near Derby. This interesting old tramway was the property of the Derby Canal Company, and was used in connection with coal pits in the vicinity. The line has been out of repair for some time and the Midland Railway has decided that after more than a century's good work this local tramway has outlived its usefulness. This tramway was named after one of the Outrams, who was an engineer, surveyor and ironmaster, placed in a position of responsibility by the Duke of Norfolk in charge of his mining propositions in the Midlands. It was Outram who advised the Duke of Norfolk to lay down tramways made of cast-iron plates in the shape of the letter "L," the plates being spiked down to wooden sleepers. Outram's tramway was, of course, an immediate success, fewer horses and drivers being required, but it was combated by the colliery employees, who were so indignant that they smashed the plates, burned the sleepers and put an end for the time to the usefulness of the line. The road was, however, relaid, and, as stated above, has existed until the present day.

There have been several minor accidents in England recently, but no fatal ones. In Liverpool recently a tramcar left the rails and overturned on a passing wagon, and in Halifax a workmen's car while ascending a hill began suddenly to run backward, owing to the cutting off of the power, and left the rails. In this connection it may be interesting to note that A. W. Maley, formerly assistant engineer of the Leeds Corporation Tramways, has invented a brake which the Corporation of Birmingham is trying on several of its cars. It is a combination of the mechanical and electromagnetic brakes, the brake shoes acting on the track itself and not on the wheels. So far the experiments have been successful, but whether the brake will be generally adopted has not yet been decided. Other municipalities are also experimenting with different types of brakes.

A. C. S.

NEW PUBLICATIONS

Standard Polyphase Apparatus and Systems. By Maurice A. Oudin. New York: D. Van Nostrand Company; 1907; fifth edition; 369 pages (5¼ in. x 7¾ in.), including 207 illustrations and 21 tables. Price, \$3.

When a technical book passes through five editions in less than eight years, it is a fair presumption that its author has found an appreciative public. Mr. Oudin has succeeded in the difficult task of making a.c. apparatus understood without using mathematics except a few simple graphs and equations. His descriptions are always to the point and betray the individuality of the writer who knows his subject well enough to explain it in his own way. This edition has been brought up to date, notably in taking up turbine developments, the mercury rectifier and giving more attention to the single-phase motor in view of its increased use. The printing and binding of the book do full justice to the contents.

Hydro-Electric Practice. By H. Von Schon. Philadelphia: J. P. Lippincott Company; 1908; 372 pages (7½ in. x 9¼ in.) and index; illustrated. Price, \$6. net.

As a hydraulic engineer brought into frequent touch with many non-technical people financially interested in water-power projects, the author of this work realized the need of a guidebook particularly suited to their wants. Consequently, he has been obliged to cover a wider field and include more elementary material than if the book were intended only for engineers. Mr. Von Schon, in fact, has set himself the task of considering hydro-electric problems from every important commercial and engineering standpoint. His main thesis appears to be to show, first, that a properly located hydro-electric plant can produce power at a lower cost than steam or gas plants, and, second, what course of action should be pursued in finding the cost of such a plant and building up a profitable consumption for its output. The book is splendidly printed and contains hundreds of original drawings and photographs made by the author.

News of Electric Railways

The Cleveland Situation

The week in Cleveland has been used in preparing for the campaign that is to be made on the referendum vote and in discussing whether the labor organizations, as such, will aid the street railway employees who are on strike in defeating the security franchise at the polls. Mayor Johnson has said that the company may be compelled to ask the Council for the privilege of charging a cent for transfers during the winter on account of the decrease in pleasure traffic.

The announcement was made a few days ago that the Iron Molders' Union No. 218 would not support the street railway employees and that several other union bodies would not issue instructions to members as to how to vote. On the other hand, the employees say that they have the support of the Trades & Labor Council. John Resley, secretary and business agent of the Iron Molders' Union, however, has been nominated on the Johnson ticket for the Legislature.

No conference of the committee on the trusteeship of the Municipal Traction Company's stock has been held since last week, as several members were out of the city.

Robert Gibson, a property owner on Olivet Street, has secured a temporary restraining order to prevent the Municipal Traction Company from tearing up the street in front of his residence and converting it into a switchyard for cars.

The charge of excessive crowding of cars during the rush hours is again being made. The Euclid cars, especially those going to East Cleveland, are invariably crowded during the evening hours. The East Cleveland cars run to the union station and pick up all the passengers that can comfortably ride before they reach the public square on their return.

The two suits brought against the Municipal Traction Company by the village of East Cleveland to compel the company to operate at a 3-cent fare and upon a schedule fixed by the Council have been continued to Oct. 26, a few days after the referendum vote is to be taken.

The Municipal Traction Company has made public its earnings for August. The gross receipts show a decrease as compared with July and the operating expenses an increase. The surplus for the month is only \$5,407.34, as against \$19,696.32 for July. The first two months of operation showed a loss, as has already been stated in the *ELECTRIC RAILWAY JOURNAL*. The statement for the four months of operation is as follows:

	May.	June.	July.	August.
Gross earnings.....	\$356,380	\$409,279	\$437,174	\$427,656
Operating expenses.....	276,920	299,047	282,662	286,299
Net earnings.....	\$79,460	\$110,232	\$154,512	\$141,357
Taxes	\$21,803	\$22,342	\$22,602	\$22,525
Interest rental.....	39,195	38,341	38,836	40,046
Dividend rental.....	73,378	73,378	73,378	73,378
Total	\$134,376	\$134,061	\$134,816	\$135,949
Surplus .....	.....	.....	19,696	5,407
Deficit	54,916	23,829	.....	.....
Total deficit to Sept. 1, \$53,642.				

The report on the property of the Cleveland Railway, operated by the Municipal Traction Company, made primarily for the underwriters by the Cleveland Inspection Bureau, showed that the total amount of insurance carried on all the properties is \$5,306,550 and that the average rate is 0.37548, making the total premium almost \$20,000. The insurance is written under one general form with 90 per cent reduced-rate clause, blanketed and written annually, with warranties covering maintenance of sprinkler equipment, auxiliary fire protection and appliances, watchman and clocks. No claim is allowed for loss under \$500. As an insurance risk the properties are considered very good by the bureau, as the shops and car houses of greatest value are equipped with approved automatic sprinklers which are carefully maintained. The power houses are all of fire-resistant construction, with the exception of one, which is held in reserve. The company is criticised, however, for allowing the trolleys to remain on the wire while the cars are in storage. The bureau advises that fire be drawn from stoves in cars before they are run into the houses for storage, and that all pits be kept clean. The report recommends that signs absolutely forbidding smoking be placed in the buildings in order to secure obedience to the rule. The total number of cars in service is 1118, including sweepers, snow plows, pay cars and work cars. Of these, 048 are in daily use. Car houses, power stations and battery houses

are taken up individually and suggestions made for improving them. Bi-monthly inspections of the properties are made by the bureau, but only at fixed intervals are complete inspections and reports made.

The Municipal Traction Company has issued a four-page paper called "The Public," in which arguments for the company are set forth. The first issue contained the statements for the first three months of operation and told something of what the company is to do under its present arrangements. The paper will be issued twice a month and is intended to be a campaign document for the referendum election.

New York Public Service Commissions Have Power to Modify Order of Railroad Commission

Two cases involving the jurisdiction of the Public Service Commissions of New York were decided by Justice Fitts, in the Supreme Court, on Sept. 23. Alternative writs of prohibition were asked for by the towns of West Seneca and Cheektowaga, Erie County, against the Public Service Commission for the Second District and the Terminal Railway, Buffalo, in June last. These cases were argued on Aug. 8 before Justice Fitts, in Special Term. The issue involved was whether the commission had the power to entertain an application for a modification of an order made originally by the Railroad Commissioners. It was practically conceded by counsel for both sides that if the determination of the Railroad Commissioners was judicial in its character the Public Service Commission could not review its determination nor consider any change in the circumstances or conditions by reason of facts occurring after the determination of the Railroad Commissioners, while if the powers exercised by the Railroad Commissioners were administrative in their character, the jurisdiction of that board had devolved upon the Public Service Commission and the latter would have a continuous administrative power which it might exercise at any time for sufficient cause shown. Justice Fitts denied the application. He said:

"The particulars in which the determination of the former Railroad Commissioners was sought to be modified were administrative details and within the continuing jurisdiction and control of the Public Service Commission, the successor of the Railroad Commissioners and the exercise of jurisdiction and control over the items sought to be modified is an administrative and not a judicial function or duty. The Public Service Commission is an administrative board having some judicial functions, but the particulars in respect to which the modification of the order of the Railroad Commissioners of April 30, 1907, is desired were not judicial in their nature, but administrative; therefore a writ of prohibition will not lie to restrain the performance of the contemplated acts."

Compulsory Owl Service in Kansas City.—The City Council of Kansas City, Kan., has passed an ordinance requiring the Metropolitan Street Railway to furnish an hourly owl-car service on the Tenth Street line from midnight to 6 o'clock a.m.

Fatal Accident on Berlin Elevated Railroad.—Two trains on the Berlin Elevated Railroad collided on Sept. 26 in the heart of the eastern commercial district, upon what is known as "The Triangle." Eighteen persons were killed and many injured. One of the cars was thrown to the street 40 ft. below.

Fined for Misusing Transfers in Chicago.—Seven persons were arrested at Root and Halsted Streets, Chicago, on Sept. 22 on charges of violating the city ordinances governing the misuse of street-car transfers. Three of those arraigned in court on Sept. 23 were fined \$5 each. The other cases were continued.

Ohio Company Accused of Violating Franchise Terms.—At a meeting of the Council of Delhi, Ohio, last week, the village solicitor was instructed to take steps to annul the franchise of the Cincinnati, Lawrenceburg & Aurora Traction Company, on the ground that it had hauled gravel through the streets as freight to fill an order, when the franchise allows the company to haul gravel for its own use only and not as freight.

Chicago Elevated Stub Terminal.—Work is progressing rapidly on the stub terminal of the Northwestern Elevated Railroad in North Water Street, between the Clark Street and Wells Street viaducts, and it is expected that trains will be running over it by Dec. 1. Fifteen trains an hour will

be run from the station at first. The company feeling that its patrons have failed to appreciate the advantages of the exit turnstiles installed by it at Argyle and other stations on its Evanston line, has had them removed.

Central Illinois Line Opened.—The line of the Springfield, Clear Lake & Rochester Intercurban Railway between Springfield and Clear Lake, Ill., was opened Sept. 14, when a party of officials and guests in charge of J. E. Melick, president and general manager, made the trip over the line in a special car. It is intended to commence work on a line to Pawnee this fall and from that point to build a connection with the Hillsboro city line, now operated by the company.

Columbus, Ohio, Rail Case Reaches Court.—The case of the Ohio Electric Railway against the City of Columbus, Ohio, in which the company asks an injunction to prevent the city from tearing up its track on East Mound Street, has been brought to trial before Judge Thomas M. Bigger. The company says that T-rails are essential to assure the safety of its cars. The city is endeavoring to have the T-rails replaced with grooved rails under an ordinance passed some months ago. W. A. Gibbs, district manager of the Ohio Electric Railway, and John Kerwin, superintendent of tracks of the Detroit United Railway, for the company, both stated that the grooved rails were not well adapted for interurban cars and that many advantages accrue through the use of T-rails.

Central Electric Meetings This Week.—Two of the affiliated associations of the Central Electric Railway Association have arranged for meetings at Indianapolis on Oct. 3. One of these is the Central Electric Traffic Association, which has an important matter to consider in the filing of concurrences to the sale of the Central Electric Railway Association interchangeable mileage ticket, as required by the Interstate Commerce Commission. In addition, M. W. Glover, chairman of the Central Electric Accounting Conference, has called a meeting of that conference to discuss the uniform blanks and methods of accounting, required by the sale and use of the interchangeable mileage book. The Traffic Association will meet at the Claypool Hotel and the Accounting Conference in Room 306 of the Traction Terminal Building, the association headquarters.

Meeting of Electric Motor Manufacturers.—The fall meeting of the American Association of Electric Motor Manufacturers was held at Frontenac, New York, Thousand Islands, Sept. 9, 10 and 11. During the meeting the following papers were presented: "Ratings and Guarantees on Direct-Current Motors," by J. M. Hipple, presented by W. T. Hensley; "Ratings and Guarantees on Alternating-Current Motors," by C. S. Reno; "Ratings and Guarantees on Variable-Speed Motors for Elevator Service," by W. J. Warder, Jr.; "Freight Traffic," by W. B. Everest. W. H. Tapley was regularly installed as the permanent secretary of the association, J. C. McQuiston, who has acted as temporary secretary since the formation of the association, retiring. The association has provided permanent headquarters in the Engineering Societies Building, 29 West Thirty-ninth Street, New York. The next meeting will be held in January, 1909.

Plans for New Jersey Trolley Terminal Approved.—The Public Service Corporation of New Jersey has approved the plans for proposed terminal building for its lines to adjoin the terminals of the Delaware, Lackawanna & Western Railroad and the Hudson & Manhattan Railroad, operating under the Hudson River, in Hoboken. The building will have a frontage of 400 ft. on Hudson Street, with a width at the widest part of 60 ft., where the building approaches the terminal of the Delaware, Lackawanna & Western Railroad. It will be two stories high with tracks on both the ground and second floors and is designed to avoid congestion in the movement of either cars or passengers. The surface cars will enter the ground over a single-track loop passing through the building with an enclosure, at one section of which will be an exit and at another the entrance to the cars. Four stairways lead down to the tunnel of the Hudson & Manhattan Railroad. There will be other entrances from Hudson Street to the building and additional exits. The second floor will be used entirely for the elevated traffic. The cars which enter Hoboken by way of the elevated railway will pass on a loop through the eastern end of the building and out through the west. At one side of the tracks a passage will lead to a bridge from the eastern end of the building over the plaza of the Delaware, Lackawanna & Western Railroad to the ferry terminal beyond. Passengers will thus be able to proceed direct to the upper decks of the boats without encountering the teams and street traffic below. Leading from the second story there will be a balcony stairway extending to the sidewalk on either side of the street, making it unnecessary for passengers to cross the car tracks when entering the terminal from the street.

Financial and Corporate

New York Stock and Money Market

SEPT. 29, 1908.

After the sharp decline and an easy and buoyant partial recovery, the stock market has settled back into its condition of apathy. During the weeks of decline and recovery there were average sales of more than 5,000,000 shares per week, but at the present time the sales do not reach half that amount. Prices have not entirely recovered to the high points of the year, but they have recovered from 4 to 10 points and are apparently as well sustained as at any time during the upward movement which began last spring. It is evident that the market is professional and in the control of interests which are ready at all times to absorb the rather limited offerings of stock. These interests can maintain prices, unless conditions change, at any reasonable level that is desired. There is, however, no evidence that the public has become interested in the market. The sharp decline of two weeks ago has shaken out many of the small dealers who were operating on narrow margins. Many of the followers of the upward movement felt safe in the belief that no breaks would be permitted, but their confidence has been shaken. Agitation concerning the political situation created an opportune moment for the professionals to bring about a decline. The alarm that was aroused regarding the apathetic condition of the Republican campaign made the creation of a selling movement an easy task. That the political condition is regarded as much more satisfactory at present is evident from the steadiness of the market and the light offerings of shares.

Money rates on Sept. 29 were: Call, 1¼@1½ per cent, and 90 day funds, 2¾@3 per cent.

Other Markets

In the Philadelphia market trading in traction securities has been less active during the past week than during the weeks immediately preceding. Philadelphia Rapid Transit, which was unusually active for a time, has quieted down and only a few shares changed hands Sept. 29 at 19¼. Some shares of Union Traction were sold at 47 to 47½, a few Philadelphia Electric at 9½, and small lots of Consolidated Traction of New Jersey at 67. Philadelphia Company stock sold at 39.

There was little interest in traction issues in the Boston market. Massachusetts Electric common sold in limited amounts at about 10 and the preferred sold at 52. Boston Elevated was practically dormant, with quotations at 133¾. Other issues did not appear on the market.

In Baltimore, as usual, the only interest in traction securities was in the bonds of the United Railways. The income bonds were traded in rather freely at 51¾ to 51½.

A few sales of Chicago Railways 1sts at 99, and Chicago Railways 2ds at 40¾ almost entirely covered the transactions in traction securities in the Chicago market. These sales were in small lots.

Traction stocks have not been active on the Cleveland Stock Exchange for several days. Two small lots of Cleveland Railway were sold last week at 89¾, the bids running all the way from 85 to 89½ without other takers. One lot of Washington, Baltimore & Annapolis pooling certificates sold at 10½, but outside of this transaction the bids did not exceed 10½. Eighty shares of Aurora, Elgin & Chicago preferred sold at 80 and a few small lots of Northern Ohio Traction & Light at 17. Some trading took place in Lake Shore Electric at 5½, but the demand was not active.

Quotations for various traction securities as compared with last week follow:

	Sept. 22.	Sept. 29.
American Railways Company, Philadelphia.....	44½	44
Boston Elevated Railway.....	133¾	132
Brooklyn Rapid Transit Company.....	46½	46½
Chicago City Railway.....	a180	a180
Cleveland Railway.....	88	—
Consolidated Traction Company of New Jersey.....	a67½	a67½
Consolidated Traction Company of New Jersey, 5 per cent bonds.....	105	a104
Detroit United Railway.....	38	38
Interborough-Metropolitan Company.....	10¼	10½
Interborough-Metropolitan Company (preferred).....	29½	32
Manhattan Railway.....	135	138
Massachusetts Electric Companies (common).....	9	10
Massachusetts Electric Companies (preferred).....	48	52
Metropolitan West Side Elevated Railway, Chicago (common).....	a13¼	a13
Metropolitan West Side Elevated Railway, Chicago (preferred).....	a44	a45
Metropolitan Street Railway.....	30	28
North American Company.....	60	61
Philadelphia Company, Pittsburg (common).....	38¼	39
Philadelphia Company, Pittsburg (preferred).....	40	40
Philadelphia Rapid Transit Company.....	19	19½
Philadelphia Traction Company.....	88½	*88
Public Service Corporation, 5 per cent collateral notes..	—	a97
Public Service Corporation, certificates.....	—	a70
Twin City Rapid Transit Company, Minneapolis (common).....	86	85½
Union Traction Company, Philadelphia.....	46½	47

* Asked.
* Last sale.

Annual Report of the Northwestern Elevated Railroad

Gross earnings of the Northwestern Elevated Railroad of Chicago for the year ended June 30, 1908, increased \$362,872, or 17.28 per cent over the preceding year, but as operating expenses, taxes and charges increased 20.51 per cent the net gain in the surplus was but \$3,310. The earnings for two years compare as follows:

Year ended June 30.	1907.	1908.	Increase.
Passenger earnings.....	\$1,559,816.37	\$1,857,753.53	\$306,937.16
Other earnings (including loop net earnings).....	549,499.60	605,434.31	55,934.71
Total earnings.....	\$2,109,315.97	\$2,463,187.84	\$362,871.87
Maintenance of way and structure.....	\$50,681.25	\$40,114.59	*\$10,566.66
Maintenance of equipment.....	141,738.23	130,380.75	*11,357.48
Conducting transportation.....	458,773.64	693,759.80	234,986.16
General expenses.....	93,110.90	100,861.34	7,750.44
Total operating expenses.....	\$744,304.02	\$965,116.48	\$220,812.46
Net earnings.....	\$1,356,011.95	\$1,498,071.36	\$142,059.41
†Taxes.....	\$217,311.32	\$226,380.63	\$9,069.31
Bond interest.....	791,122.50	802,837.42	11,714.92
Other interest.....		117,965.52	117,965.52
Total charges.....	\$1,008,433.82	\$1,147,183.57	\$138,749.75
Surplus.....	\$347,578.13	\$350,887.79	\$3,309.66
Ratio of operating expenses to earnings (excluding loop net earnings).....	46.38	50.22	
Ratio of operating expenses, loop account and taxes to earnings (excluding loop net earnings).....	64.36	66.64	

*Decrease. †Includes compensation to city on account of loop. Reserve for maintenance has been kept at \$250,000.

M. B. Starring, president of the company, states that the increase in operating expenses was due principally to an increase in car miles operated, from 7,441,578 car miles for 1907 to 10,316,206 car miles for 1908, occasioned largely by the opening and operation of new lines, although the cost of operation per car mile decreased 6.5 per cent. High rates of interest occasioned by the financial conditions of the past winter also affected the final results.

The amount paid under the Loop contract to the city of Chicago increased during the year \$20,764, or 38.6 per cent over the previous year. Under the terms of this contract the rate of payment was increased, beginning on January 1, 1907.

Mr. Starring states that "the physical condition of the property has been, as usual, maintained at the proper standard." Forty new coaches were added during the year and 20 additional motor cars have been ordered and are under construction, for delivery in the autumn. When these cars have been received the total number in service will be 348. The total power capacity of the company on June 30, 1908, was 67 per cent greater at the close of the fiscal year than on June 30, 1907. This is exclusive of the capacity of the union loop power house.

Reference is made to the opening of the surface Ravenswood extension and the Evanston extension. Excepting the loop lines, the miles of track in operation on June 30, 1908, were 51.07, increase of 83 per cent over the previous year.

Mr. Starring says in relation to other matters of interest: "It is gratifying to note that whereas our Sunday business two years ago was poor, and a weak spot in the company's earning capacity, it has now so improved as to be satisfactory. The average receipts for the six Sundays intervening between the opening of the Evanston line and June 30, 1908, show average receipts of \$4,848.59, as compared with an average of \$3,408.70 for the corresponding Sundays of 1907, and \$2,582.12 for 1906, an increase in two years averaging \$2,266.47 per Sunday, or over 87.75 per cent.

"The frontage consents necessary as a condition precedent to the passage of an ordinance for the stub track on North Water Street were obtained, and an ordinance therefor duly introduced in the City Council. Construction work begins promptly, and this additional facility will be completed and ready for the use of the company's patrons by Dec. 1, 1908.

"The question of extending the loop platforms is pending before the Local Transportation Committee of the city of Chicago, and will be taken up on reconvening of the City Council.

"Your attention is called to the vigorous work of improvement and extension, which, during a period of a little more than the year covered by this report, has accomplished much for the development of your property and the betterment of the service rendered to its patrons."

First Ruling in Massachusetts Stock Issue Case Under New Law

The Railroad Commissioners of Massachusetts on Sept. 21 took their first action under the law passed by the Legis-

lature authorizing street railways and railroads to fix the price at which their stock shall be offered for sale and refused to approve an issue of 2500 shares of stock of the Fitchburg & Leominster Street Railway, which the stockholders had voted to issue at par. In its order dismissing the petition the board calls attention to the fact that on Sept. 17, 1907, it approved an issue of stock to a similar amount, but fixed the price under the then existing law at \$110 per share. The Railroad Commissioners say:

"Each case under the existing law must stand upon its facts and circumstances. It appears by the sworn return of the treasurer of the company that on July 1, 1908, its assets were \$1,541,360.28; capital stock, \$450,000; notes payable, \$606,500. The company may fairly be called one of the successful street railways of Massachusetts, in good physical condition, well managed and serving a growing community. It is one of the few in the list of street railways certified by the Railroad Commissioners to the bank commissioner as having properly paid, without impairment of assets or capital stock, a dividend of not less than 5 per cent per annum for the five years last preceding the certification.

"While the law of 1908 was intended to liberalize the State's policy with respect to the issue price of increases of railroad and railway stock, it did not affect the principle upon which the issue price of the securities was formerly established. The standard only was changed from 'such price not less than the market value thereof at the time of increases as may be determined by the Railroad Commissioners, taking into account previous sales of stock of the company and other pertinent conditions,' to 'price at which such stock is to be offered as fixed by the stockholders, provided that the board shall refuse to approve any particular issue of stock if, in the opinion of the board, the price fixed by the stockholders is so low as to be inconsistent with public interest.'

"The phrase 'so low as to be inconsistent with public interest,' undoubtedly difficult of exact definition, must, in connection with the legislative act of 1908, be taken to mean in any specific case an issue price materially lower than a price which would assure a ready market for the issue.

"The facts ascertained by our investigations, with our knowledge of the affairs of the petitioner, convince us that the Fitchburg & Leominster Street Railway can readily obtain \$250,000 for the purposes authorized by the statute by an issue of shares materially less in number than 2500. We therefore must find that the price fixed by the stockholders at \$100 per share is so low as to be inconsistent with the public interest."

Chicago, Ottawa & Peoria Railway, Ottawa, Ill.—This company, the capital stock of which is owned by the Western Railways & Light Company, an ally of the Illinois Traction Company, the same interests being in control, recently filed a mortgage to the Central Trust Company of Illinois, as trustee, to secure an issue of \$5,000,000 bonds, of which \$1,400,000 are outstanding. The bonds are 5 per cent, dated Dec. 1, 1907, and due Dec. 1, 1937. They are guaranteed by Western Railways & Light Company.

Washington, Baltimore & Annapolis Railway, Baltimore, Md.—A meeting of the stockholders of the Washington, Baltimore & Annapolis Railway has been called for Oct. 9, at which it is proposed to take action toward increasing the capital stock \$750,000, making a total capital of \$6,000,000. It is stated that additional money is needed to care for unexpected expenditures and improvements that were not contemplated in the original plans.

Dayton (Ohio) Street Railway.—This company has filed with the Secretary of State notice of an increase in capital stock from \$10,000 to \$1,200,000.

Scioto Valley Traction Company, Columbus, Ohio.—This company has increased its capital stock from \$3,000,000 to \$3,500,000.

Toledo Railways & Light Company, Toledo, Ohio.—The regular monthly meeting of the Toledo Railways & Light Company was held on Sept. 24. The defaulted interest on the merger bonds was discussed, but it was stated that no conclusion was reached.

Philadelphia, Bristol & Trenton Street Railway, Philadelphia, Pa.—The receivership under which Charles L. Brown and Samuel Crowther, Jr., were placed in charge of the affairs of the Philadelphia, Bristol & Trenton Street Railway by the Bucks County Court was subsequently vacated by the court which created it and Mr. George Blakistone and John A. Rigg have been appointed receivers by the United States Circuit Court, as previously announced in the ELECTRIC RAILWAY JOURNAL.

Rio de Janeiro (Brazil) Tramway, Light & Power Company, Ltd.—This company has listed on the London Stock Exchange \$456,600 additional first mortgage, 30-year, 5 per cent gold bonds.

Traffic and Transportation

Chicago City Railway Issues Regulations for Right of Way

As a precaution against accidents, motormen on cars of the Chicago City Railway have been furnished with cards on which are printed the rules of the company governing the right of way of street cars.

The rules are as follows:

"North- and south-bound cars have right of way over east- and west-bound.

"North-bound cars have right of way over south-bound.

"East-bound cars have right of way over west-bound.

"Cars entering curves have right of way over straight-line cars.

"Approach all crossings, curves, bridges and special work slowly, even where you have the right of way. When in doubt, stop."

Uniforms for Elevated Employees in Brooklyn.—After Oct. 1 the Brooklyn Rapid Transit Company will require male ticket agents of the elevated lines to wear uniforms.

Ohio State Fair Furnishes Heavy Business.—Electric roads entering Columbus were compelled to turn patrons away during the State fair recently because of lack of equipment, so great was the volume of traffic offered.

Collision Near Philadelphia.—A fog was responsible for a head-on collision on Sept. 23 between two cars of the Southwestern Traction Company between Philadelphia and Chester, in which about 50 persons were injured.

Accident on New York Elevated Railroad.—Twenty persons were injured in a rear-end collision of trains of the Interborough Rapid Transit Company on the elevated railway, between Third Street and Fourth Street, on Sept. 28.

Massachusetts Road Given Freight Rights.—The Railroad Commissioners of Massachusetts have approved the petitions of the Gardner, Westminster & Fitchburg Street Railway for authority to do a general express business in Gardner, Westminster and Fitchburg.

Proposed Limited Service Between Toledo and Dayton.—About Oct. 1 the contractors will turn the Bellefontaine-Lima division of the Ohio Electric Railway over to the company. The officials of the company are arranging for a two-hour service between Lima and Springfield. Later through service will be installed between Toledo and Dayton.

Rhode Island Company Adopts Winter Schedule.—The Rhode Island Company established its winter schedule on Sept. 15, discontinuing service to the places on the Providence River. The Rocky Point line will not resume operation until next summer, except on days when ball games are played there. The Pawtucket & Crescent Park line now stops at Broadway Six Corners in East Providence, and Riverside cars have been put on a 20-minute schedule, instead of 10 minutes.

Change in Schedule by Fort Wayne & Wabash Valley Traction Company.—The Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind., placed a new schedule in operation on its lines on Oct. 1. Cars now leave Fort Wayne on the Lafayette line at 6 a.m., 8 a.m. and 10 a.m., 12 noon and 2 p.m., 4 p.m., 6 p.m., 8:30 p.m. and 11 p.m. There are no through limited trains to Lafayette. No change has been made in the time of the limited trains for Indianapolis and they continue to leave at 7:20 a.m. and 9:20 a.m. and 1:20 p.m. and 5:40 p.m. On the Bluffton line cars leave at 6 a.m., 7 a.m., 8:10 a.m., 9:45 a.m. and 11 a.m., and 12:15 p.m., 1:30 p.m., 2:45 p.m., 4 p.m., 5:15 p.m., 6:30 p.m., 9 p.m. and 11:30 p.m.

New Train Service on the Brooklyn Bridge.—The new steel overhead trolley approach across Sands Street, at the Brooklyn end of the Brooklyn Bridge, has been completed and most of the Brooklyn surface cars running to and from Park Row, New York, began operating over the approach on Sept. 28. The cars run over the new structure at about the same level as the elevated trains, but pass outside of the station building and over the deck to Concord Street, Brooklyn, and there descend to the street by two inclines, one to Fulton Street and the other to Washington Street. Cars approaching the bridge from Brooklyn leave Fulton Street and Washington Street at Tillary Street, pass into the bridge yard, ascend after crossing Concord Street by an incline to the railroad deck, outside of the station building on the north side and reach the roadway at the face of the Brooklyn anchorage. The congestion at the Sands Street entrance of the bridge, in Brooklyn, is thus eliminated.

Personal Mention

Mr. E. B. White has been appointed manager of the Alexandria (La.) Electric Street Railway.

Mr. G. A. Boone has resigned as assistant claim agent of the Municipal Traction Company, Cleveland, Ohio.

Mr. T. P. Mason has been appointed auditor of the Havana (Cuba) Central Railroad, to succeed Mr. Wm. L. Richard.

Mr. C. L. de Muralt has been reappointed professor of electrical engineering at the University of Michigan for the coming year.

Mr. E. M. Hedley, general superintendent of the Hudson & Manhattan Railroad, New York, has tendered his resignation to take effect Nov. 5. Mr. Hedley has not yet announced his plans for the future.

Mr. Charles J. Peurrung, Jr., has been appointed auditor of the Cincinnati, Milford & Loveland Traction Company, Milford, Ohio, to succeed Mr. J. H. Rudd, who acted in the capacity of auditor for about three years.

Mr. F. H. Knox, formerly secretary of the Spartansburg Railway, Gas & Electric Company, Spartansburg, S. C., has been elected vice-president and general manager of the company, succeeding in the latter office Mr. F. D. McEowen.

Mr. J. L. Greatsinger, Brooklyn, N. Y., has been elected president of the Corning & Painted Post Street Railway, Corning, N. Y. Mr. Greatsinger at one time was president of the Brooklyn Rapid Transit Company and is identified with real estate development in Brooklyn.

Mr. James Conner, manager of the electrical works of Dick, Kerr & Company, at Preston, England, arrived in New York Sept. 26 to inspect recent notable electrical undertakings which have been carried out in this country. He will make a tour of the principal cities in the East and Central West.

Mr. Frank H. Viele, Boston, and Mr. John H. Robinson, Hudson, have been elected to fill the vacancies in the board of directors of the Concord, Maynard & Hudson Street Railway, Maynard, Mass., caused by the death of Mr. Henry Tower and the resignation of Mr. E. H. Mather. Mr. John W. Ogden has been elected treasurer of the company to succeed Mr. Henry Tower, the former treasurer.

Mr. W. J. Wilgus has resigned as special engineer of the Public Service Commission of the First District of New York. Mr. Wilgus was retained by the commission to supplement its work by reporting on the problems involved in the operation of freight trains over Eleventh Avenue, in New York City, by the New York Central Railroad. Mr. Wilgus was formerly vice-president of the New York Central Railroad and is now president of the Amsterdam Corporation of New York.

Mr. Thomas Penney, Buffalo, whose proposed election to the presidency of the International Traction Company, Buffalo, was mentioned in the ELECTRIC RAILWAY JOURNAL for



Thomas Penney

Sept. 26, was formally elected to that position at the meeting of the directors of the company on Sept. 29 to succeed Mr. Henry J. Pierce. As previously stated in the ELECTRIC RAILWAY JOURNAL, Mr. Penney is a prominent attorney in Buffalo and a member of the law firm of Norton, Penney & Sears, which for some time past has acted as counsel for the International Traction Company. Through the connection of his firm with the International Traction Company, Mr. Penney is generally familiar with the company's affairs. The system which will come under his management comprises the lines in Buffalo, Niagara Falls, Lockport, Tonawanda, North Tonawanda and vicinity, and includes the Buffalo & Niagara Falls Electric Railway, the Buffalo, Bellevue & Lancaster Railway, the Buffalo & Lockport Railway and several other interurban lines. The company also owns hotel and amusement resorts at Olcott Beach and Bellevue Park and controls Kenmore Park. It operates in all 358 miles of standard gauge track.

Mr. Wilbur C. Fisk, vice-president of the Hudson & Manhattan Railroad, New York, will, after Nov. 5, have entire control of the operation of the road, the position of general superintendent having been abolished. Mr. Fisk, who is interested in the firm of Harvey Fisk & Sons, was educated at Princeton, where he graduated as a civil engineer. He has had wide experience in engineering enterprises and was at one time connected with the work of dredging New York bay.

Mr. D. A. Hegarty, treasurer and general manager of the Little Rock Railway & Electric Company, Little Rock, Ark., was elected president of the Kansas Association of Public Utility Operators at the meeting of the association in Little Rock on Sept. 17 and 18. Mr. Hegarty was born in Philadelphia and was



D. A. Hegarty

educated at the University of Pennsylvania. His first railroad experience was in the engineering department of the Pennsylvania Railroad, by which he was engaged as assistant engineer on construction and maintenance work for six years. After leaving the Pennsylvania Railroad, Mr. Hegarty entered the electric railway field with the late Mr. A. Langstaff Johnson as engineer in charge of the Richmond (Va.) Electric Railway, the first commercially successful electric road in America. Continuing his connection with Mr. Johnson, Mr. Hegarty assisted in the construction of numerous railway, light and power companies in different parts of the country, among them the Hestonville, Mantua & Fairmount Passenger Railway, Philadelphia. Subsequently, he became general manager and chief engineer of the Hestonville, Mantua & Fairmount Passenger Railway, in which capacities he continued until the property was taken over by the Union Traction Company. Mr. Hegarty next became chief engineer of the Norfolk (Va.) Railway, but resigned from the Norfolk company to accept the position of superintendent of the Railways Company General, a holding and operating company, of which Mr. John B. McAfee was vice-president and general manager. Mr. Hegarty was general superintendent of this company until he joined the operating forces of Ford, Bacon & Davis as general manager and treasurer of the Little Rock Railway & Electric Company.

OBITUARY

Leslie Carter, formerly president of the South Side Elevated Railroad, Chicago, and a prominent financier and lawyer, died at his home in Chicago on Sept. 25, after a long illness, which had incapacitated him for business. Mr. Carter was born in Galena, Ill., on Aug. 28, 1851. He graduated from Yale University, and after studying law, entered business in Chicago.

Frank DeHaas Robison, who at one time was interested in a number of electric railway properties in the United States and Canada, among them the Cleveland City Railway, died at his home in Cleveland on Sept. 25. Mr. Robison was born in Pittsburg about 46 years ago, but spent the greater part of his boyhood at Dubuque, Ia. He was educated at Ohio Wesleyan University, Delaware, and began his business career when he was 18 years old. When he was 23 years old, Mr. Robison married Miss Sarah P. Hathaway, of Philadelphia. Subsequently he formed a partnership with Mr. Charles Hathaway, his father-in-law, under the firm name of Hathaway & Robison, and built the Cleveland Cable Railway on Superior Street and Payne Avenue. Later he became president of the Cleveland City Railway, but retired from active street railway work when the Cleveland City Railway and the Cleveland Electric Railway were consolidated. While Mr. Robison was interested in a number of roads, his most prominent connections were in Cleveland, Fort Wayne, Ind., and Hamilton, Ont. At Fort Wayne, he established Robison Park, on the line of the company in which he was interested. Mr. Robison was a member of the Union and Roadside clubs and was a 32d degree Mason. He is survived by a widow, a daughter and a brother, M. Stanley Robison.

Construction News

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

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

FRANCHISES

Oakland, Cal.—The ordinance granting the San Francisco, Oakland & San Jose Railway (Key Route) a franchise to run cars on Poplar Street, Oakland, between Twenty-third and Twelfth Streets, has been so amended as to read for 47 years only, and was passed to print by the Oakland City Council recently. The time was specified in this way so that the franchise would expire at the time of the Twenty-second Street franchise, both being a part of the same system.

Pasadena, Cal.—The Pacific Electric Railway has purchased from the Council a franchise for its line on East California Street to Tournament Park for \$100.

Riverside, Cal.—The City Council has passed an ordinance granting the Riverside & Arlington Railway a right to construct a single or double-track electric railway, commencing at the westerly city limits of the city.

San Francisco, Cal.—At a meeting of the Board of Supervisors on Sept. 21 permits were granted to the United Railroads to lay track temporarily at Market and Second Streets, and also at Market and Twelfth Streets. A permit was also granted the company to lay tracks from a point on Pacific Avenue between Polk and Van Ness, to the company's car house.

South Bend, Ind.—A new franchise was granted to the South Bend & Logansport Railway at a meeting of the County Commissioners last week. The old franchise expires Oct. 1. The new franchise says that work on the road shall be started not later than June 1, 1909. [E. R. J., May 15, '08.]

***Manhattan, Kan.**—The City Council has granted a franchise to W. R. West and Joseph T. West, of Kansas City, for an electric railway system to be built in Manhattan. Construction is to begin within 30 days, and one line to the agricultural college, a distance of 2 miles, is to be completed within six months.

Kansas City, Mo.—Application has been made to the County Court at Independence for a right of way for the Kansas City & Southeastern Railroad. The right of way has been secured through the town of Lee's Summit, and through the farm lands lying between that point and Kansas City. The court indicated that such a franchise would be granted, provided the county counselor framed a document preserving the rights of the county as to railroad crossings, and the railway management would accept it. The matter was referred to County Counselor German.

Mineola, N. Y.—The Second District Public Service Commission has granted the New York & North Shore Traction Company, of Roslyn, N. Y., permission to extend its railway system from Mineola to Hicksville. The Nassau County Supervisors have granted the company an extension of six months on its franchise to build and put in operation an electric railway from Roslyn to Manhasset.

Salt Lake City, Utah.—LeGrand Young, president of the Emigration Canyon Railway, has asked the County Commissioners for an extension of the franchise the company already holds. A right of way is asked to carry passengers and freight over Twenty-first East Street from the southern limit of Salt Lake City to Fourteenth South Street, and thence to Twenty-third East Street, with the right to construct a railway in the middle of the street and on grades that the county may establish. The time for which the franchise is asked is 50 years. [E. R. J., Aug. 15, '08.]

RECENT INCORPORATIONS

***California Company, San Francisco, Cal.**—This company has been incorporated to build an electric railway from San Francisco to Sacramento. Two branches are to be constructed, one to Petaluma, 18 miles, and the other to Napa, 5 miles. As planned the new line will connect with the Napa & Lakeport Electric Railway. The main line will be 95 miles long. It will run through Marin, Sonoma, Napa, Solano, Yolo and Sacramento counties, with a terminus at the State capital. Capital stock, \$2,500,000. Incorporators: C. W. Conlisk, R. A. Morton, C. H. Lind, L. N. Pryor, George James, Frank E. Cronice and Russell B. Field. It

is said that this company will act as a preliminary merger company and that it will take over the Bay Counties Railway, the Napa & Sacramento Railway and the Napa & Vaca Valley Railway.

***Sacramento (Cal.) Terminal Company.**—This company has been incorporated for the purpose of financing the Northern Electric Railway Company's plans for the completion of its terminal in the town of Broderick, across the river from Sacramento. Capital stock, \$250,000. The new company is affiliated with the Northern Electric Railway, and will run two lines from Sacramento to Broderick, connecting them with the Northern Electric tracks in Sacramento. Directors: Herbert W. Furlong and Charles W. Harmon, Berkeley, and W. G. Hyde, John Leechman and Chauncey J. Goodrich, San Francisco.

***Valparaiso & Northern Railway, Valparaiso, Ind.**—Incorporated to construct and operate street and interurban railroads in Porter County. Capital stock, \$10,000. The first line will be constructed from Valparaiso to Chesterton. A system will also be built in Chesterton. Headquarters, Valparaiso. Directors: George G. Pfeiffer, L. E. Woodard, D. R. Chase, M. J. Cook and W. R. Watson, all of Chicago.

Grand Isle Development & Construction Company, New Orleans, La.—This company has been chartered to construct an electric railroad from New Orleans to Grand Isle, as projected by the New Orleans & Seashore Air Line Railway. Capital stock, \$300,000. Directors: L. H. Marrero, Sr., L. H. Marrero, Jr., J. W. T. Stephens, Seeley Dunn and Charles Farwell.

***Hobart Motor Railroad, Guthrie, Okla.**—This company has been granted a charter to build a number of lines. One extends from Hobart northwest through Kiowa, Washita and Beckham counties to the Texas Panhandle, which borders Roger Mills County, a distance of 80 miles; another passes through Kiowa and Tillman counties to the State border in Comanche County, 75 miles; a third through Kiowa, Washita, Caddo and Canadian counties to Oklahoma City, 125 miles, and a fourth through Kiowa and Jackson counties to the town of Altus, 55 miles. All the roads originate in the town of Hobart. The estimated cost of construction and equipment is \$15,000 per mile. Capital stock, \$100,000. Incorporators: H. H. Hoover, R. E. Nye, Arthur Johnston, A. B. Wey, J. H. Montgomery and Jacob Slanor, all of Hobart.

***Rapid City & Wyoming Railway, Rapid City, S. D.**—Incorporated in South Dakota to purchase or construct a line from Rapid City to Mystic, a distance of 35 miles. Headquarters at Rapid City. Capital stock, \$500,000. Incorporators: H. W. Jones, H. E. Swander, L. A. Richards, J. C. Haines, E. M. Reeves, F. H. Rugg, G. P. Bennett, W. F. Pascal and Thomas Sweeney, all of Rapid City, S. D.

TRACK AND ROADWAY

Parkside Transit Company, San Francisco, Cal.—This company has commenced work on laying double tracks on its railway system in the Parkside district. The company started operating that line with a single track $3\frac{1}{2}$ miles in length in January last. The traffic justifies laying 4 miles additional track.

Point Loma Railroad, San Diego, Cal.—D. C. Collier, president of this company, is reported to have placed an order with the Colorado Fuel & Iron Company for the necessary steel rails for the Point Loma line. The Point Loma Railroad is the successor to the Point Loma Electric Railway, which was formed about a year ago for the purpose of building an electric railway connecting with the San Diego Electric Railway Company's lines and extending along Point Loma to Roseville and Ocean Beach. [E. R. J., July 25, '08.]

Burlington Interurban Railway, Greeley, Col.—At a recent meeting of the directors of the Burlington Interurban Railway, which is building an electric railway from Hudson on the Burlington to Greeley, Pleasant Valley, Ault and Fort Collins, the resignation of F. O. Olson as president was accepted and John P. Klug was elected to the vacancy. C. I. Moore, of Greeley, was elected treasurer. All surveys are made and grading is expected to be begun in a few days. [E. R. J., Aug. 15, '08.]

Washington, Alexandria & Mt. Vernon Railway, Washington, D. C.—This company, in conjunction with the Washington Southern Railway, is planning to make a number of improvements on King Street, in Alexandria, Va., to cost about \$18,000.

Sparks Western Railway, Sparks, Ga.—The ELECTRIC RAILWAY JOURNAL is officially informed that this company, a notice of whose incorporation appeared in the issue of Sept. 19, 1908, does not intend to construct an electric railway system.

Middle Georgia Interurban Railway, Griffin, Ga.—Engineering corps are now engaged in making a survey of this proposed electric railway from Jackson to Griffin. L. W. Roberts, of Atlanta, and W. F. Smith, of Flovilla, are in charge of the work. It is estimated that the road will be about 70 miles in length. The line will be built from Griffin, Jackson, Mansfield and Social Circle, with a branch to Flovilla. [S. R. J., Aug. 3, '07.]

Chicago (Ill.) Railways.—The reconstruction of the Adams Street line of this company was begun this week. The rehabilitation of Adams Street will extend from the river to State Street. New tracks are to be laid also on Van Buren Street from Clinton to Dearborn; Fifth Avenue from Madison to Twelfth and Dearborn Street from Polk to Kinzie Street. The plans for the work have been completed and the company expects to have the new tracks ready for traffic before winter.

Galesburg, Aledo & Northwestern Railroad, Galesburg, Ill.—Lafayette Weinberg, one of the incorporators of this road, writes that the company plans to construct a gasoline motor line, connecting Galesburg, Aledo, Alexis, Ill., and Musatine, Ia. Mr. Weinberg says that it is probable that construction work will begin this fall. B. F. Arnold, president, and Capt. F. W. Latimer, secretary, have been elected temporary officers. The company will be fully organized when all of the stock is sold. Capital stock, \$10,000. [E. R. J., Sept. 19, '08.]

Taylorville (Ill.) Railway, Light, Heat & Power Company.—H. C. Huebner, representative of a syndicate of Minneapolis, Minn., capitalists, who has been going over the route of the proposed electric railway between Nokomis-Taylorville with W. B. Adams, of Taylorville, is reported to have announced that the money to build the line will be obtained within 30 days. The road will be 21 miles in length and the route will be the old Nokomis-Taylorville wagon road through Johnson, Bear Creek and Greenwood townships, in Christian County. The road will be capitalized at \$1,000,000. The right of way has been secured along the entire route, including the street franchises in Taylorville and Nokomis. [E. R. J., June 6, '08.]

Indianapolis, New Castle & Toledo Traction Company, Indianapolis, Ind.—David M. Parry and Wm. E. Stevenson, promoters of this company, have transferred portions of their private property to the Union Trust Company, trustee, to secure funds to complete the road between Indianapolis and New Castle. Work has already commenced. The system, when completed, will connect Indianapolis, Greenfield, New Castle, Muncie, Richmond, Winchester and Toledo.

Kendallville, Ligonier & Goshen Traction Company, Kendallville, Ind.—C. C. Beyer writes that this company, which was incorporated on Sept. 16, 1908, plans to build an electric railway which will connect the following cities: Kendallville, Brimfield, Wawaka, Ligonier, Millersburg, Benton and Goshen. Capital stock, \$10,000. Headquarters, 511 South State Street, Kendallville. Officers: Elmer E. McCray, president, Kendallville; Haines Egbert, Goshen, vice-president; C. C. Beyer, Kendallville, secretary-treasurer; T. A. Redmonds, Kendallville, general counsel. [E. R. J., Sept. 9, '08.]

Des Moines & Sioux City Railroad, Lake City, Ia.—At a meeting on Sept. 21 of the stockholders of this company at Lohrville, it was decided to increase its capital stock from \$20,000 to \$1,000,000. A new board of directors was also elected. The company has already begun actual work on the line. Two routes have been surveyed for the greater part of the distance between Des Moines and Sioux City; one of these has been secured. At present the route decided upon runs through Polk, Dallas, Boone, Greene, Calhoun, Sac and Woodbury. The line will be 192 miles in length. M. H. Miller, vice-president and general manager.

Des Moines, Council Bluffs & Omaha Railroad, Des Moines, Ia.—The ELECTRIC RAILWAY JOURNAL is informed that this company contemplates constructing a standard-gauge electric railway system, 140 miles in length, which will connect the following cities: Des Moines, Adel, Redfield, Guthrie Center, Audubon, Harlan, Council Bluffs and Omaha. This road is a part of the Northwest Iowa system of interurban lines projected by M. H. Miller, of Des Moines. Two other companies, the Spirit Lake, Emmetsburg, Fort Dodge Railway and the Des Moines & Sioux City Railroad, are also a part of this system, which is to cover Iowa with a network of electric railways reaching as far west as Omaha, Neb. The company has decided to adopt the overhead trolley system, but as yet has not considered any site for the location of its power station and repair shops. Mr. Miller states that construction work on the road will begin as soon as a sufficient equity of stock and right of way is secured. The company was chartered

Sept. 2, 1908, with a preliminary capital of \$30,000. Headquarters, Des Moines. Officers: J. W. Russell, Adel, Ia., president; Frank Hopkins, Guthrie Center, Ia., vice-president; M. H. Miller, Des Moines, Ia., secretary and general manager; E. Lockwood, Harlan, Ia. [E. R. J., Sept. 12, '08.]

Cincinnati, Newport & Covington Light & Traction Company, Covington, Ky.—At a meeting of citizens at Erlanger, Ky., last week, it was announced that \$20,000 had been subscribed by residents of that place and Florence toward extending the tracks of this company from St. Mary's Cemetery to Erlanger. It is the intention to extend it to Florence also. The amount required is about \$40,000 and the officials state that the extension will be made as soon as the money is ready.

Lake Charles (La.) Railway & Light Company.—It is reported that this company will build an extension out Eleventh Street to Kirkman, to Hi Mount addition, 1½ miles long. Surveys have been partly made and right of way has been obtained. Contracts probably will be let in the spring. Thompson J. Bird, Lake Charles, president.

Boston (Mass.) Elevated Railway.—Erection of steel-work for the Forest Hills extension of the Boston Elevated Railway is now in progress at the Arborway. The steel has been erected as far as the northerly end of the proposed station in Forest Hills Square. The structure is designed for a single post crossing of the Arborway, the column being about 11 ft. in diameter and octagonal in shape. At the south approach of the Washington Street tunnel the masonry incline is practically completed; the train floor is protected with a facing of brickwork laid in Hydrex compound, and within the next to days it is planned to lay track. At the north approach to the tunnel the steel for the south-bound East Cambridge track has been erected and a portion of the track is in place. The work of erecting a temporary trestle for connecting the present south-bound elevated track with the East Cambridge track is under way, and within a few weeks trains will be operated upon this track while the present south-bound elevated line is removed and a new line built in its place.

Yazoo City (Miss.) Electric Railway.—The State Trust Company, of Vicksburg, Miss., has taken a bond issue of Yazoo City, Miss., to build an electric railway in that city. The trust company has awarded the contract to build the line, and when it is completed will turn it over to the city, which will operate it. Four miles of track will be constructed, which will include four turnouts on different lines and overhead works complete. The power station will be built by the city, under the supervision of T. W. Pocklington. The company will install all the necessary equipment, as follows: One engine, one generator, to be furnished by the Southern Electric Company, and one Buckeye engine. It is expected that the road will be completed and ready for operation by Jan. 1, 1909. [E. R. J., Aug. 22, '08.]

North Jersey Rapid Transit Company, Paterson, N. J.—The contract for this road, to be built between Paterson and Suffern, has been awarded to John R. Lee, of Paterson. The line, which will be 15 miles long, is to be finished, according to the terms of the contract, in four months, and will be an electric railway system. It is intended that it shall be the nucleus of a high-speed electric line which will probably be installed later between Paterson and Hoboken by a separate concern, known as the New York & New Jersey Rapid Transit Company, which, although acting separately, is identified with the same interests. It is expected that the Paterson-Hoboken line will be put in as soon as necessary funds can be obtained, but no contracts have been awarded as yet. The president of the Paterson-Suffern line is William Barber, of Paterson, and the vice-president is Malcolm R. McAdoo, of Montclair. The total cost of the new line, it is estimated, will be \$500,000. Work will be begun next week. It is intended that the proposed extension by the New York & New Jersey Rapid Transit Company between Paterson and Hoboken shall be a third-rail system. The road will join the McAdoo tunnel, and so give direct access to New York. [E. R. J., Sept. 12, '08.]

Buffalo (N. Y.) Southern Railway.—The directors of this company announced on Sept. 22 following a meeting that the line between Buffalo and East Aurora will be in operation by Nov. 15. A stretch of nearly a mile between Buffalo city line and Lein's Park will be finished within two weeks and be operated immediately after completion.

Bennington & North Adams Street Railway, Hoosick Falls, N. Y.—At a meeting of the stockholders of this company, it was unanimously voted to approve the plan of abandoning the line in Hoosick Falls, which extends from the junction of Main and Church Streets to River, to Third, to Elm Streets and to the Elm Street crossing of the Boston & Maine Railroad Company.

Interborough Rapid Transit Company, New York, N. Y.—The Rapid Transit Subway Construction Company contemplates the building of two additional tracks on each side of the present subway from Ninety-sixth to 101st Streets, in order to avoid grade crossings at this point. The work is being done by the construction company, and other contracts will not be let except for steel work. The estimated cost is \$1,000,000.

Rochester, Corning & Elmira Traction Company, Rochester, N. Y.—This company has been authorized by the Public Service Commission to sell and issue the first installment of \$1,000,000 of its bonds. The company proposes to build and operate an electric railway between Rochester, Corning and Elmira, that will permit the operation of high-speed express trains, besides slower local trains. The road is to be built in sections, beginning at the south line of Rochester. The first section will include the distance between Rochester and Lakeville, on Conesus Lake, and other sections will be begun as soon as the first is well under way. L. Feuerstein, 27 Church Street, Rochester, engineer.

Schenectady (N. Y.) Railway.—It is said that this company will pay one-third of the cost for the construction of the Villa Road culvert. The city and the New York Central Railroad will pay the other two-thirds. The New York Central engineers will prepare plans for this structure, which will not cost over \$55,000. It will be of concrete construction, with an arch spanning a 40-ft. roadway, with sidewalks on either side, each 5 ft. wide.

Columbus, Delaware & Marion Railway, Columbus, Ohio.—General Manager George Whysall, of this company, is reported to have said a few days ago that the extension from Marion to Bucyrus, Ohio; will be completed within a few weeks and that before winter through cars will be in operation between Columbus and Bucyrus. Connections will also be made with other lines for Cleveland and Toledo. The construction company is now operating a two-hour service between Marion and Bucyrus.

Northern Ohio Electric Railway, Defiance, Ohio.—It is said that this company, which proposes to build the proposed electric railway from Defiance to Montpelier, is now investigating another route, a line from Rockford, Ohio, to Coldwater, Mich. It is proposed to leave the Dayton-Fort Wayne line at Rockford and run a line north through Van Wert, Paulding, Defiance and Bryan to Montpelier and eventually to Coldwater, Mich. It is said that steps will soon be taken to make the preliminary surveys.

Toronto & York Radial Railway, Toronto, Ont.—This company is said to be planning to extend its line from Yonge Street to Markham village and on to Locust Hill, eventually reaching Port Perry. W. H. Moore, general manager.

Mid-Continent Traction Company, Tulsa, Okla.—This company, organized and chartered last year in Oklahoma to build a standard gage electric railway, 110 miles in length, connecting Tulsa, Sapulpa, Shawnee and intermediate points, is reorganizing with new Kansas City, Detroit and Indianapolis capital, preparatory to the resumption of construction work. Much preliminary work has been done on the lines intended to be covered by this company, and light and power franchises, together with selected inter-urban park properties and right of way, have been secured. Headquarters, Tulsa, Okla. Officers: F. L. Smart, president; Graham Burnham, vice-president and general manager; F. Brown, treasurer; J. Robert Burnham, chief engineer, all of Tulsa.

Chambersburg & Western Electric Railway, Chambersburg, Pa.—At a meeting of this company at St. Thomas last week it was decided to begin a canvass for a right of way for this new line to St. Thomas at once. R. W. Ramsey, president.

Juniata Valley Electric Street Railway, Huntingdon, Pa.—This company has a force of men at work grading the road to Cold Springs Park, which is now being built. The park has four large springs, and consists of about 117 acres of land, and is situated about 2 miles north of Huntingdon. It is the intention of the company to have this line to the park in operation early next spring. R. W. Jacobs, president.

Titusville (Pa.) Electric Traction Company.—W. J. Smith, of Titusville, president of this company, is reported to have announced that construction work on the proposed extension which is to connect Titusville with Union City by way of Riceville and Lincolnville will be started within the next 30 days and that the first work of grading would be done on the Union City end of the line. The preliminaries have been completed and it is said that the last of the right of way has also been secured between Clappville and Cambridge Springs.

***El Paso Valley & Fort Hancock Electric Railway, El Paso, Tex.**—This company is reported to have been formed recently to build an electric railway from El Paso to Fabens. About \$40,000 has been pledged to the new line by local land owners. It is stated that as soon as \$50,000 has been pledged to the electric line a meeting of the stockholders will be held, the organization completed and arrangements made to ask for the franchise. Among those interested in this new project are J. S. Reynolds, Chas. N. Bassett and Felix Martinez.

Central Texas Traction Company, Corsicana, Tex.—In the issue of the *ELECTRIC RAILWAY JOURNAL* for Aug. 29, 1908, an item was published mentioning the incorporation of this company. Under date of Sept. 16, 1908, the following letter was received from the Post Office Department at Washington, D. C., in reply to our inquiry of Sept. 10: "The business methods of the Central Texas Traction Company, Corsicana, Tex., have been investigated by a post office inspector under case 119591-C. The report, together with all the papers, was submitted to the assistant attorney general for the Post Office Department, upon whose recommendation a fraud order was issued on Dec. 6, 1907, directing the postmaster at Corsicana, Tex., not to deliver mail addressed to the Central Texas Traction Company, nor to pay any postal money order drawn to the order of this concern."

Big Bend Transit Company, Spokane, Wash.—It is stated that this company is making preliminary arrangements toward the building of an electric railway from Spokane to the Columbia River. The company has decided to increase its capital stock from \$100,000 to \$3,000,000, and the application for this change will probably be made in a few days. A power site near the mouth of the Spokane River has been secured. The company has also secured other sites along the Spokane River. In addition to this riparian rights for a mile and a half along the Columbia River above the junction of the Spokane have been granted by the government.

Milwaukee (Wis.) Electric Railway & Light Company.—This company has just opened for traffic a new electric extension from Eighth Street along Burleigh Street and Teutonia Avenue to the northern city limits.

POWER HOUSES AND SUBSTATIONS

British Columbia Electric Railway, Vancouver, B. C.—This company has awarded the contract to John McDougall & Company, of Montreal, Que., for the installation of an 11,000-hp turbine at Lake Buntzen, which, with other improvements, will cost \$300,000.

Capital Traction Company, Washington, D. C.—This company is building a new transformer station at First and B Streets, southwest. James L. Parsons has the contract for the new building, and the contract calls for an expenditure of about \$30,000. It will have a frontage of 30 ft. and a depth of 80 ft., and will be two stories in height.

Buffalo & Lake Erie Traction Company, Buffalo, N. Y.—Contracts have been let by this company for the construction of three substations to E. J. Bailey, of Brocton. The stations will be built at Silver Creek, Dunkirk and West Portland. The buildings are to be almost identical, fire-proof in construction, of brick and concrete, with concrete roofs. The buildings will be 38 ft. x 51 ft. in dimensions.

Mansfield (Ohio) Railway, Light & Power Company.—This company is reported to be in the market for a new 500-hp boiler, also a 1000-hp or 1500-hp engine. It is stated that the company intends to have the new apparatus installed and ready for operation by Dec. 1, 1908.

Elkins (W. Va.) Electric Railway.—This company is building a temporary power station on the Viquesney farm, near Elkins, and will install a 150-hp gas engine. The permanent power station will be at Roaring Creek Junction.

SHOPS AND BUILDINGS

Columbus, Delaware & Marion Railway, Columbus, Ohio.—The freight and passenger station of this company on West Gay Street, Columbus, has been opened for business. The building has been entirely remodeled and a large waiting room provided. Wide platforms will also be added.

AMUSEMENT PARKS

Fort Wayne & Wabash Valley Traction Company, Fort Wayne, Ind.—This company is said to be negotiating with parties at Wabash and Peru for the leasing of Boyd Park, a popular summer amusement resort operated by the traction company, and if the deal is closed the place will be converted into the home of a country club composed of people of the two towns. The park is located 6 miles west of Wabash and 8 miles east of Peru.

Manufactures & Supplies

ROLLING STOCK

New Orleans Railway & Light Company has just received and placed into immediate service 20 of the 35 single-truck cars recently ordered from the McGuire-Cummings Car Company. The bodies of the cars are made of wood, and are 20 ft. 8 in. in length. The cars are equipped with "Peacock" brakes, "Baltimore" trucks, two GE-80 motors, and have vestibules at both ends. The cars have been distributed to the Orleans, Villere, Carondelet and Peters Avenue lines.

Athens (Ga.) Electric Railway has recently received two semi-convertible cars from the American Car Company. Details of the cars follow:

Seating capacity.....	32	Height inside.....	8 ft. 1 in.
Weight	14,340 lb.	Sill to trolley base,	
Wheel base.....	6 ft. 6 in.		9 ft. 11 in.
Length of body....	20 ft. 8 in.	Height from track to sills,	
Length over all...	30 ft. 1 in.		26½ in.
Width inside.....	.92 in.	Body	Wood
Over all.....	.98 in.	Underframe	Wood

Special Equipment	
Axles	4 in. Motors, type and number,
Brake rigging.....	Standard 2, GE-67
Brakeshoes	Standard Roofs
Car trimmings.....	Bronze Sanders
Control system.....	K-12 Seats, Brill rattan. Walk-
Couplers,	over, with corner grab
	handles.
Curtain fixtures.....	Acme Steps
Curtain material,	Printed duck Trolley poles and attach-
	ments, U. S.
Destination signs....	Hunter Trucks, type and make,
Gears and pinions.....	GE Brill, No. 21, E
Gongs	Dedenda Ventilators
Hand brakes.....	Peacock Vestibule, Enclosed ends
Heating system.....	Electric with stationary round end
Headlights....	U. S. Electric vestibules and automatic
Interior finish,	No. 1, Palace, cherry doors.
Journal boxes.....	Brill Special devices, etc.—
	Push buttons and electric bells.

TRADE NOTES

C. P. Wood, Atlanta, Ga., has established an office, as manufacturers' agent for power-plant and mill equipment, at 1028 Candler Building.

McCabe Construction Company, Portland, Ore., has been incorporated to build and equip steam or electric roads in the State of Oregon, Washington and Idaho. Capital stock, \$5,000. Incorporators: Andrew J. McCabe, A. C. Spencer and C. M. Johns.

Indiana Tie Company, Evansville, Ind., has been incorporated to build and equip a plant to treat railroad ties chemically, increasing their life from 15 years to 20 years over that of an ordinary tie. Capital stock, \$600,000. Directors: Allen Gray, William W. Gray, Robert R. Williams and Joseph Wastger.

Engineering Service Company, Inc., New York, electrical engineer and purchasing representative, announces that it has established offices in the West Street Building for the transaction of a general electrical engineering and contracting business in the equipment of industrial, power and other plants. Gerard B. Werner is president of the company, and Robert Josephi is secretary and treasurer.

General Electric Company, Schenectady, N. Y., has secured, through Guinle & Cia, its Brazilian agents, a contract to equip the Central Railway of Brazil with electricity as motive power as soon as the project now pending for the electrification of a section of that railroad is decided upon. Guinle & Cia have also been granted a federal concession covering the supply of light and power to Sao Paulo, a city of 300,000 inhabitants, known as the largest coffee market in the world.

American Blower Company, Detroit, Mich., reports that it is receiving a very satisfactory volume of business and mentions among other orders the following, received since Sept. 1: Forced-draft equipment, Ault & Wiborg, Cincinnati, Ohio; forced-draft equipment, Hocking Valley Railroad, South Shops, Columbus, Ohio; roundhouse-heating equipment, Northern Pacific Railroad, Paradise, Mont.; roundhouse-heating equipment, New York Central & Hudson River Railroad, Avis, Pa.; forced-draft apparatus, Gluck Realty Company, Niagara Falls, N. Y.; ventilating apparatus, Carnegie Science Hall, Wittenberg College, Springfield, Ohio; forced-draft apparatus, Central Union Gas

Company; heating and ventilating apparatus, Mahoning County Court House, Youngstown, Ohio; special gas exhauster, Lincoln (Neb.) Gas & Electric Light Company; forced-draft apparatus, Garfield (Utah) Smelting Company.

ADVERTISING LITERATURE

Jacobson Machine Manufacturing Company, Warren, Pa.—This company describes in Bulletin K, just issued, its gas and gasoline engines for electric lighting service.

Carnegie Steel Company, Pittsburg, Pa.—This company has issued an illustrated pamphlet descriptive of the seawall at Fort St. Phillip, La., an interesting and important installation of steel piling. The illustrations show the work at various stages.

General Railway Signal Company, Rochester, N. Y.—A number of the principal devices manufactured by the General Railway Signal Company and used in automatic signaling are illustrated and described in Section 5 of the company's catalog, entitled "Automatic Block Signaling for Steam Roads."

Cagney Brothers, New York.—These well-known manufacturers of amusement apparatus have issued a pamphlet describing their aerial circle swing, miniature autodromes or merry-go-rounds and their miniature railroads, which have been used for so many years both for amusement and utility in park and exposition service.

American Brake Shoe & Foundry Company, Chicago Heights, Ill.—This company has issued a four-page circular in which are illustrated and listed its manganese steel castings. Among its products are jaw crusher parts, gyratory crusher parts, crushing roll parts, stamp mill parts, screen parts, wheels, placer gold dredge parts, steam shovel parts, ore chutes, etc.

Graphite Lubricating Company, Bound Brook, N. J.—This company has issued a pamphlet showing the application of its graphite and bronze bushings, bearings and washers. Of its bearings for high-speed work the company says that its graphite-lined stuffing box bearings are now being used in steam turbines running at 25,000 r.p.m. where oil was formerly used, and that the possibility of oil entering the exhaust of the turbine has been eliminated. The bearings are equally serviceable for gas engines. A very successful feature of the company's business has been its bearings for trolley wheels.

General Electric Company, Schenectady, N. Y.—The direct-connected generating sets of this company, ranging in size from 2½ kw to 75 kw, are described in Bulletin No. 4617. Designed originally to meet the severe conditions of marine work, which demand light, compact and durable sets of close regulation and quiet operation, they are also said to be well adapted for both power and lighting in isolated plants and as exciters for alternating-current generators in central station work. The company has also issued price lists Nos. 5181 and 5186 of GE tungsten street series lamps and Edison incandescent lamps, respectively.

Electric Storage Battery Company, Philadelphia, Pa.—This company has just issued the second section of a new series of sectional price-lists. It covers the elements, jars and tanks of the Chloride Accumulator for electric railway, central lighting and power, isolated lighting, interlocking switch and signal, telephone, telegraph, fire alarm, laboratory, small motor work and miscellaneous service, and is known as Section A. It will be followed by other sections covering the many applications of the Chloride, Exide and Tudor accumulators. Copies will be forwarded upon application to any of the sales offices of the company. Section C, covering the Chloride accumulator and Tudor accumulator for car lighting service was issued in June.

Goheen Manufacturing Company, Canton, Ohio.—This company is sending out a pamphlet which shows the comparative results in cost per ton, labor and material of three brands of paint used on the Crescent bridge of the Davenport, Rock Island & Northwestern Railway Company over the Mississippi River at Davenport, Iowa. The results are tabulated on a fac-simile of a blue print issued by the railroad company, while the pamphlet contains another table consisting of deductions made by the chief engineer of the Goheen Manufacturing Company to demonstrate the superior results from his company's paint. The pamphlet also contains an illustration of the bridge of which the test records were kept.

C. Lee Cook Manufacturing Company, Louisville, Ky.—This company's metallic packing for steam, gas, air and other power engines is described in a 36-page folder. The packing is especially adapted to heavy duty service and engines operating under very high steam pressure and superheat. The single and double type piston rod, single and double type Corliss valve stem and the split type

metallic piston rod packings are described and illustrated. As the only wearing portions of the packing are the babbitt metal rings, which are segments, the packing can be applied to the engine without disconnecting the piston rod or the valve stem. It is a floating packing and works equally well when the engine is not in perfect alignment, and as it is a pressure packing, releasing its compression to the rod when the steam is exhausted from the rod side of the piston, the power of the engine is increased. Further, it will give satisfaction without the use of oil cups, according to the manufacturer. The folder is concluded with a list of users of the packing which includes many large street railway companies, electric light companies, engine builders and others, among the names being the Detroit United Railway, Lexington (Ky.) Railway, Brooklyn Rapid Transit Company, Philadelphia Rapid Transit Company, Public Service Corporation of New Jersey, Twin City Rapid Transit Company, Allis-Chalmers Company, Atlas Engine Works, Ball Engine Company, Buckeye Engine Company and Westinghouse Machine Company.

The Goldschmidt Thermit Company, New York.—"Reactions," published in the interest of the Goldschmidt Thermit Company, has been issued for the third quarter of 1908. The contents includes articles entitled, "Hard Spots in Steel Castings," "Welding the Entire Rail Section—A New Development," "New Thermit Reactions," "Thermit Welding on Locomotives, Frames and Other Work," "Welding Street Railway Special Work" and "New Shops for Thermit Repair Work." The article entitled "Welding Entire Rail Sections" has for its subject the work carried out by the company for the Union Railway Company of New York on the bridge over the Harlem River, which was described in the *ELECTRIC RAILWAY JOURNAL* for June 27, 1908. The methods of surmounting the peculiar conditions and obstacles met in this work are clearly set forth. Half-tone engravings are presented of the air compressor and shear, the shear in operation, the running face of the rail with the thermit steel collar ground off and the grinder for finishing the top of the rail. Among the line engravings shown are the details of the shear and a section of the bridge roadway, showing the chair for the rails. The company in writing of its new shop in Jersey City says that extensive facilities will be provided for making repairs to broken steel sections and electric motor cases, truck and frames of trolley cars, anchors, gear wheel, etc. The company will also make a specialty of welding compromise joints at its shops. "Reactions" also contains a description of the new gasoline-compressed air torch, which is specially adapted to pre-heating in connection with thermit welding. The torch is fitted with a needle valve of new design, which gives an exceedingly close regulation of the compressed air and gasoline, ensuring perfect combustion at all times.

The Rooke Automatic Register Company, Providence, R. I.—This company has issued a very artistic folder entitled "An Idea Harnessed," in which the Rooke system of fare collection is thoroughly described. The Rooke register is intended to be carried in the hand and is arranged to receive only nickels. It is not a repository for fares; after a fixed number of coins have been registered the conductor trips the device and the coins are dumped into his hand. In this way the conductor has nothing to do with the registration of the money or with the money itself until after it has been registered. Another advantage of the system is that the possibility of disputes between conductors themselves regarding the condition of the register when it is given them is eliminated, the register furnishing an accurate record of each man's work for the day. The Rooke system of fare collection was first placed in service on the lines of the Rhode Island Company, Providence, R. I., in the spring of 1907. The registers were used on the lines of heavy traffic in the city and those running to the pleasure resorts along the Providence River. At the present time more than 1000 of the registers are in use in Providence, Pawtucket, Woonsocket and Attleboro, where zone fares are in use. Another thousand registers are now used exclusively on the street railways of some ten other smaller cities, of which Des Moines, Iowa, is perhaps the most important. The use of the Rooke register in Providence has eliminated the printed report or forms. The conductor uses the old trip cards, enters the register number and reading, as usual, and at the end of each half trip sets down the new reading. The number of cash fares collected is obtained by subtraction. A feature of the pamphlet is a double-page illustration of the front of the register and the back of the register in the hand of the operator, showing how the register conforms to the shape of the hand. The Rooke register is especially adapted for pay-as-you-enter cars and is in service on pay-as-you-enter cars in Des Moines, Ia.

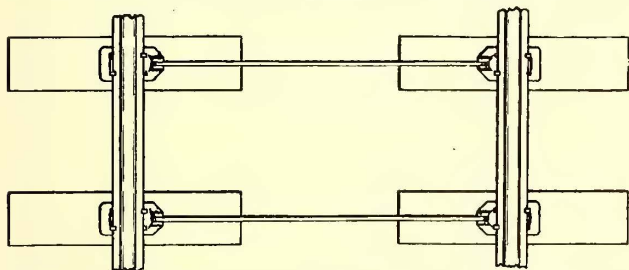
ELECTRIC RAILWAY PATENTS

[This department is conducted by Rosenbaum & Stockbridge, patent attorneys, 140 Nassau Street, New York.]

UNITED STATES PATENTS ISSUED SEPT. 22, 1908.

Alternating Mechanism for Operating Switches or Other Devices, 899,032; Mark A. Dees, St. Louis, Mo. App. filed Oct. 16, 1907. Comprises a throw rod having a head, a lever adjacent to the throw rod, across which the head of the throw rod extends, means for actuating the lever, and means carried by the lever on opposite sides of the throw rod head for engaging the latter, whereby the throw rod may be alternately shifted first in one direction and then in the other.

Track Construction for Railways, 899,041; Oscar B. Grant, Davenport, Ia. App. filed March 25, 1907. In place



Track Construction for Railways. Patent No. 899,041

of the usual wooden ties, short wooden blocks are used, which are secured together by tie rods attached to tie plates which are spiked to the blocks.

Bed Plate for Iron Railway Sleepers, 899,107; August Haarmann, Osnabruck, Germany. App. filed May 20, 1907. The bed plate has a depending lug adapted to extend through a hole in the top of a metallic sleeper, the lug being so shaped that a locking connection is secured when the bed plate is positioned.

Metallic Core for Railway Ties, 899,089; William R. Westbrook, Cliff, Ky. App. filed Nov. 20, 1907. A core for concrete railway ties, composed of tubular-shaped metal having rail-block slots and a series of perforations throughout its sides, bottom and top between the slots.

Rail Bond, 899,120; George Alvin Mead, Mansfield, Ohio. App. filed March 20, 1906. Consists of a bundle of copper wires swaged to form terminal lugs, which are afterward welded into a unitary mass. Has a sheet-metal protector for the swaged ends to prevent the copper from being burned in the welding process.

Electric Signaling System for Railways, 899,134; Ara P. Rickmire, Waterloo, Ia. App. filed Dec. 30, 1907. Designed to prevent collisions at crossings. Has a cab signal and automatic train stop, and includes entire mechanical and electrical equipment.

Extension Step, 899,151; Frank X. Yung, Binghamton, N. Y. App. filed Jan. 20, 1908. A supplemental stop particularly designed for use in connection with vestibule coaches, being so positioned that when it is folded or raised into inoperative position it will house the fixed steps of the car, and thus prevent persons from boarding the coach after the vestibule has been closed.

Block Signal Apparatus, 899,153; Alexander Bevan, Providence, R. I. App. filed Dec. 3, 1906. A block signal system for single-track railways. Relates particularly to the signal target, the same being fixed to the upper end of an oscillating arm, the center of gravity of the target passing over the pivotal point in moving from clear to the danger position, and vice versa. Has electrical actuating mechanism.

Railway Tie, 899,174; William A. Lockard, Philadelphia, Pa. App. filed Feb. 20, 1908. A metallic tie having sockets of peculiar shape at its ends for the reception of wooden blocks, to which the rails are spiked.

Electromotor Controlling and Operating System for Electric Railways and Power Plants, 899,189; Johann Sahlka, Vienna, Austria-Hungary. App. filed June 1, 1907. A system of controlling and operating motors for electric railways and power plants, in which the motor actuates on the one hand a driven shaft and on the other a dynamo which supplies current to a second motor, also actuating a driven shaft.

Safety Apparatus for Cars, 899,228; Theodore A. Mayer, Washington, D. C. App. filed March 17, 1908. A locking device on the controller magnetically connected with the step of the car, so that the motorman cannot start the car until a passenger has alighted.

Rail Fastening, 899,230; Henry K. Myers, Swissvale, Pa. App. filed May 2, 1908. A saddle-plate engaging over the tie at each side of the rail and having depending side flanges extending beneath the rail and overlapping the tie. Clips are interposed between the saddle and tie, and extend therefrom out upon each side of the rail base. Means for securing the saddle and clips to the tie.

Automatic Sanding Apparatus for Fluid Pressure Brakes, 899,246; Edward G. Desoe, West Springfield, Mass. App. filed Feb. 6, 1907. Means whereby the sanding device will be automatically operated to apply sand to the rails whenever air is admitted to the brake cylinder for applying the brakes.

Railway Tie, 899,262; John C. Reed, Akron, Ohio. App. filed April 3, 1908. A metallic railway tie, the sides of which are provided with longitudinal slots under the rails and located adjacent to top, the portions of the top under the rails and over the slots being tempered. Forms a slightly yielding support.

Car for Observation-Wheels, 899,286; Achille F. Biavati, Freeport, N. Y. App. filed April 13, 1908. The cars are of cylindrical construction and are mounted in a cage on the wheel, where they maintain their proper position by gravity as the wheel revolves.

Sound-Deadening Construction for Elevated Railways, 899,293; Charles Howard Conover, Cambridge, and William D. Murphy, Newton, Mass. App. filed Sept. 23, 1907. The rails are laid in a longitudinal metallic trough in which is a continuous layer of non-vibrating material.

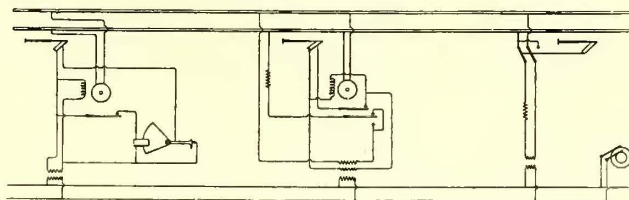
Rail Brace, 899,302; William H. Huffman, Beaver Falls, Pa. App. filed May 22, 1907. A turn-buckle rod having fish-plates at its ends which engage the rails.

Air Brake, 899,318; George W. McMunn and Allan C. Howell, Pittsburg, Pa. App. filed June 25, 1908. Has angle cocks carried by the train pipes and communicating with the brake cylinder independent of the train pipe, and movable plugs arranged in the angle cocks for releasing the cylinder and closing the train pipe.

Alternating Current Block Signaling System, 899,353; Jacob B. Struble, Swissvale, Pa. App. filed April 1, 1908. Means for controlling the operation of the distant signals without the use of wires extending back from the home signals to the corresponding distant signals. Has relays and controlling circuits so arranged that the supply of current for the distant signals is cut off and the signals are held at caution position until the corresponding home signal has cleared, with means for thereby restoring the current supply to the distant signal and clearing it.

Rail Chair, 899,354; George W. Sutherland, Newport, Wash. App. filed April 10, 1908. Details.

Means for Connecting Parallel Railroad Rails, 899,366; Vernon A. White, Aliceville, Ala. App. filed Dec. 24, 1907. Cuffs applied to the rail ends on opposite sides, a tie bar connecting the cuffs and having opposite recesses and an intervening rib which separates the bases of the rails.



A.C. Block Signal System. Patent No. 899,353

Device for Preventing Spreading of Rails, 899,426; Charles L. McVoy, Pensacola, Fla. App. filed Dec. 14, 1907. A rail chair engaging the outer web and underlying the base of the rail and having an inclined upwardly projecting head at its end adapted to interlock with a tie bar, said tie bar having enlarged ends adapted to engage the inner side of the rail webs.

Air Brake System, 899,427; James D. Nichol, Amadore, Mich. App. filed April 1, 1908. Provides means by which the pressure retaining valve can be placed under the full control of the engineer.

Brake Shoe, 899,454; Burns D. Lockwood, Indianapolis, Ind., and Frederick M. Whyte, Tarrytown, N. Y. App. filed July 25, 1908. A brake shoe having its rubbing or wearing face composed of a plurality of relatively inclined flat or plane surfaces.

Trolley Wheel, 899,474; Joseph W. Siebert, Washington, Pa. App. filed Feb. 5, 1908. The wheel has star-shaped spokes projecting beyond its flanges which have hooked extremities so designed that they close over the trolley conductor.

TABLE OF MONTHLY EARNINGS

Notice.—These statistics will be carefully revised from month to month, upon information received from the companies direct, or from official sources. The table should be used in connection with our Financial Supplement, "American Street Railway Investments," which contains the annual operating reports to the ends of the various financial years. Similar statistics in regard to roads not reporting are solicited by the editors. * Including taxes. † Deficit.

COMPANY	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income	COMPANY	Period	Gross Income	Operating Expenses	Gross Income Less Operating Expenses	Deductions From Income	Net Income
AKRON, O. Northern Ohio Tr. & Light Co.	1m., Aug. '08	209,742	107,357	102,385	43,381	59,004	LEXINGTON, KY. Lexington & Interurban Rys. Co.	1m., July '08	58,970	36,916	22,054		
	1 " " '07	216,146	112,860	103,286	43,522	59,764		1 " " '07	52,807	31,742	20,065		
	8 " " '08	1,247,878	730,391	517,486	348,596	168,891		7 " " '08	339,294	224,749	114,545		
	8 " " '07	1,274,443	736,414	538,029	339,881	198,148		7 " " '07	302,502	202,271	100,231		
BELLINGHAM, WASH., Whatcom Co. Ry. & Lt. Co.	1m., July '08	29,123	17,196	11,927	8,166	3,761	LITTLE ROCK, ARK., Little Rock Ry. & Elec. Co.	1m., Aug. '08	56,868	*28,851	28,017	11,316	16,701
	1 " " '07	30,394	17,404	12,990	7,585	5,405		1 " " '07	54,535	*27,322	27,331	8,363	18,968
	12 " " '08	362,017	204,685	157,333	93,611	63,722		8 " " '08	441,162	*227,569	213,593	80,191	133,402
	12 " " '07	325,256	187,491	137,764	77,192	60,573		8 " " '07	409,781	*216,557	193,224	67,064	126,160
BIRMINGHAM, ALA. Birmingham Ry., Lt. & Pwr. Co.	1m., Aug. '08	172,532	*119,455	53,077	43,785	9,292	MEMPHIS, TENN. Memphis St. Ry. Co.	1m., Aug. '08	141,192	*87,930	53,262	35,532	17,730
	1 " " '07	185,770	*122,788	62,982	40,750	22,232		1 " " '07	144,515	*85,782	58,733	34,447	24,287
	8 " " '08	1,408,135	*915,658	492,477	351,155	141,322		8 " " '08	1,056,721	*671,348	385,373	279,437	105,936
	8 " " '07	1,405,716	*935,583	470,133	309,482	160,650		8 " " '07	1,057,772	*654,980	402,792	267,058	135,734
CHAMPAIGN, ILL. Illinois Traction Co.	1m., Aug. '08	359,753	*195,570	164,184			MILWAUKEE, WIS. Milwaukee Elec. Ry. & Lt. Co.	1m., Aug. '08	343,511	160,889	182,622	101,155	81,467
	1 " " '07	341,599	*187,935	153,663				1 " " '07	345,535	175,519	170,016	105,022	64,994
	8 " " '08	2,615,544	*1,525,443	1,090,100				8 " " '08	2,570,819	1,326,537	1,244,281	792,860	451,421
	8 " " '07	2,377,517	*1,346,135	1,031,381				8 " " '07	2,545,110	1,277,946	1,267,164	776,873	490,290
CHARLESTON, S. C. Charleston Con. Ry. Gas & Elec. Co.	1m., Aug. '08	63,803	42,943	20,860	14,526	6,333	Milwaukee Lt., Ht. & Tr. Co.	1m., Aug. '08	149,907	35,187	114,720	65,012	49,708
	1 " " '07	64,437	40,400	24,037	14,858	9,178		1 " " '07	145,864	36,528	109,336	60,732	48,604
	6 " " '08	386,972	245,702	141,269	89,552	51,718		8 " " '08	928,896	245,793	683,103	475,494	207,609
	6 " " '07	367,379	226,067	141,311	89,030	52,281		8 " " '07	677,579	230,727	446,852	330,674	116,179
CHICAGO, ILL. Aurora, Elgin & Chicago Ry. Co.	1m., Aug. '08	153,895	71,175	82,720	27,624	55,095	MINNEAPOLIS, MINN., Twin City R. T. Co.	1m., Aug. '08	592,702	281,708	310,995	128,667	182,328
	1 " " '07	150,597	73,463	77,134	26,986	50,148		1 " " '07	558,227	260,782	297,444	115,142	182,303
	2 " " '08	302,643	143,383	159,260	55,402	103,857		8 " " '08	4,181,925	2,095,436	2,086,489	1,006,456	1,080,034
	2 " " '07	302,850	148,372	154,478	54,495	99,983		8 " " '07	3,978,826	1,929,161	2,049,666	921,600	1,128,066
CLEVELAND, O. Cleveland, Painesville & Eastern R.R. Co.	1m., July '08	33,077	*18,355	14,722	7,369	7,353	MONTREAL, CAN. Montreal St. Ry.	1m., Aug. '08	329,772	164,262	165,510	70,078	95,433
	1 " " '07	34,401	*15,893	18,508	6,796	11,712		1 " " '07	329,755	184,844	144,911	67,208	77,703
	7 " " '08	158,335	*90,827	67,508	51,018	16,490		11 " " '08	3,329,060	1,978,659	1,350,401	585,966	764,435
	7 " " '07	157,587	*84,225	73,362	50,072	23,290		11 " " '07	3,164,399	1,946,389	1,218,010	524,555	693,455
DETROIT, MICH. Detroit United Ry. Co.	1m., July '08	685,908	*417,869	268,039	135,978	132,061	NASHVILLE, TENN. Nashville Ry. & Lt. Co.	1m., Aug. '08	127,796	*78,166	49,630	32,812	16,818
	1 " " '07	707,137	*413,312	293,825	132,021	161,803		1 " " '07	131,196	*80,342	50,854	31,370	19,484
	7 " " '08	3,999,947	*2,528,176	1,471,770	948,952	522,818		8 " " '08	1,015,783	*620,566	395,217	253,973	141,244
	7 " " '07	4,022,248	*2,518,552	1,503,695	901,099	602,595		8 " " '07	1,001,275	*604,624	396,651	233,086	163,565
DULUTH, MINN. Duluth St. Ry. Co.	1m., Aug. '08	84,585	45,962	38,624	18,917	19,707	PLYMOUTH, MASS. Brockton & Plymouth St. Ry. Co.	1m., July '08	15,956	9,278	6,678	2,274	4,403
	1 " " '07	81,233	37,059	44,174	17,963	26,210		1 " " '07	17,452	7,918	9,533	2,170	7,363
	8 " " '08	576,392	352,726	223,665	147,833	75,832		12 " " '08	120,545	91,578	28,967	27,689	1,278
	8 " " '07	551,274	274,185	277,089	141,886	135,204		12 " " '07	118,394	71,656	46,738	26,296	20,442
E. ST. LOUIS, ILL. East St. Louis & Suburban Co.	1m., Aug. '08	174,381	91,104	83,277			PORTLAND, ORE. Portland Ry., Lt. & Pwr. Co.	1m., Aug. '08	365,849	174,040	191,809		
	1 " " '07	193,744	97,514	96,230				1 " " '07	359,347	188,034	171,313		
	8 " " '08	1,317,828	694,078	623,750				8 " " '08	2,848,821	1,423,785	1,425,036		
	8 " " '07	1,383,320	742,574	640,747				8 " " '07	2,563,966	1,477,061	1,086,905		
EL PASO, TEX. El Paso Cos.	1m., July '08	40,821	29,352	11,469	7,209	4,260	ST. LOUIS, MO. United Railways Co of St. Louis	1m., Aug. '08	911,515	*572,879	338,636	234,551	104,085
	1 " " '07	41,637	31,339	10,298	5,769	4,529		1 " " '07	956,240	*610,160	346,080	232,506	113,574
	12 " " '08	532,675	374,426	158,249	80,557	77,692		8 " " '08	6,973,281	*4,518,905	2,454,376	1,862,952	591,424
	12 " " '07	455,142	341,120	114,022	62,358	51,664		8 " " '07	7,185,731	*4,710,133	2,475,598	1,851,327	624,271
FT. WAYNE, IND. Ft. Wayne & Wabash Valley Tr. Co.	1m., July '08	115,470	65,482	49,988			SAVANNAH, GA. Savannah Electric Co.	1m., July '08	53,455	32,764	20,690	15,840	4,850
	1 " " '07	117,494	67,985	49,509				1 " " '07	55,452	33,601	21,851	15,024	6,826
	7 " " '08	730,670	426,075	304,595				12 " " '08	599,160	405,481	193,680	184,711	8,969
	7 " " '07	686,772	416,981	269,791				12 " " '07	585,767	362,911	222,856	164,533	58,323
FORT WORTH, TEX. Northern Texas Elec. Co.	1m., July '08	98,983	58,787	40,196	18,033	22,163	SEATTLE, WASH. Seattle Elec. Co.	1m., July '08	366,481	209,950	155,531	87,515	69,016
	1 " " '07	96,933	51,707	45,226	13,501	31,725		1 " " '07	369,133	211,933	157,200	72,715	84,485
	12 " " '08	1,063,627	618,576	445,052	179,518	265,534		12 " " '08	4,381,787	2,592,140	1,789,648	944,087	845,561
	12 " " '07	982,280	587,507	394,772	149,095	245,677		12 " " '07	3,755,460	2,161,959	1,593,501	721,517	871,985
GALVESTON, TEX. Galveston-Houston Elec. Co.	1m., July '08	93,375	52,005	41,370	17,477	23,893	SYRACUSE, N. Y. Syracuse R. T. Co.	1m., Aug. '08	106,642	64,412	42,230	29,357	12,873
	1 " " '07	98,768	53,106	45,662	16,085	29,577		1 " " '07	108,060	61,791	46,269	26,613	19,656
	12 " " '08	1,063,623	624,497	439,126	208,063	231,063		8 " " '08	846,345	502,300	344,045	231,463	112,582
	12 " " '07	994,662	590,253	404,410	182,309	222,100		8 " " '07	814,743	462,567	352,176	204,135	148,041
HOUGHTON, MICH. Houghton County St. Ry. Co.	1m., July '08	26,300	12,713	13,587	4,635	8,953	TACOMA, WASH. Puget Sound Elec. Ry. Co.	1m., July '08	158,336	99,615	58,720	39,741	18,979
	1 " " '07	26,330	12,296	14,034	4,822	9,212		1 " " '07	171,146	96,467	74,680	34,627	40,053
	12 " " '08	257,037	148,354	108,683	57,100	51,582		12 " " '08	1,674,847	1,064,144	610,702	455,704	154,998
	12 " " '07	246,749	142,799	103,950	55,785	48,165		12 " " '07	1,553,902	952,418	601,485	367,453	234,032
JACKSONVILLE, FLA. Jacksonville Elec. Co.	1m., July '08	35,559	20,691	14,868	8,324	6,544	TAMPA, FLA. Tampa Elec. Co.	1m., July '08	45,192	32,463	12,729	2,426	10,302
	1 " " '07	34,537	19,380	15,157	6,287	8,871		1 " " '07	42,515	33,093	9,422	1,309	8,113
	12 " " '08	411,650	252,096	159,555	94,592	64,963		12 " " '08	542,454	375,808	166,647	21,080	145,567
	12 " " '07	373,779	214,572	159,207	64,821	94,386		12 " " '07	503,060	338,368	164,692	20,035	144,658
KNOXVILLE, TENN. Knoxville Ry. & Lt. Co.	1m., Aug. '08	49,246	*25,641	23,605	11,483	12,121	TOLEDO, O. Toledo Rys. & Lt. Co.	1m., Aug. '08	212,454	113,869	98,585	71,879	26,706
	1 " " '07	54,856	*29,249	25,607	10,625	14,982		1 " " '07	222,122	118,524	103,598	68,668	34,930
	8 " " '08	373,066	*196,668	176,398	91,643	84,754		8 " " '08	1,644,941	907,923	737,018	563,766	173,252
	8 " " '07	394,249	*212,995	181,254	83,446	97,807		8 " " '07	1,687,189	972,698	714,491	516,243	198,248